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THE ATCHAFALAYA RIVER DELTA REPORT 9 WIND CLIMATOLOGY

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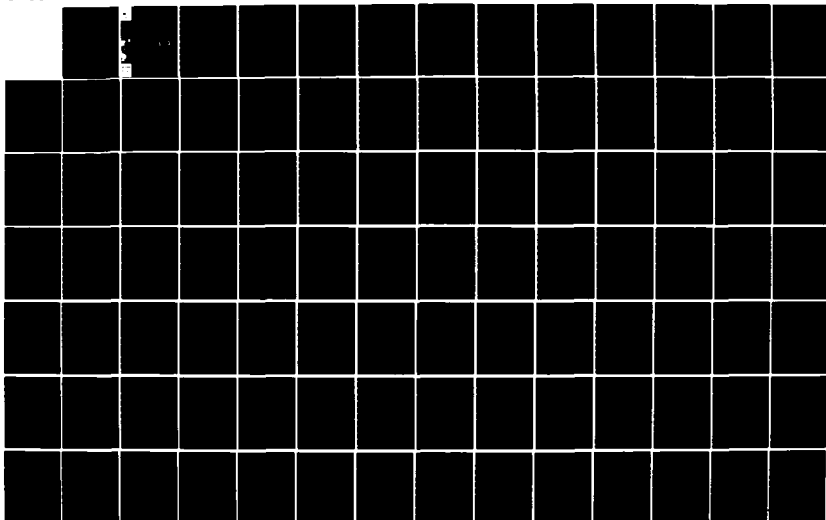
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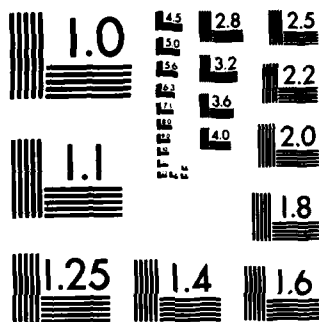
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THE ATCHAFALAYA RIVER DELTA

Report 9

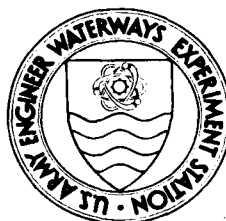
WIND CLIMATOLOGY

by

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) - This report contains a description of the wind climate typical of the Atchafalaya Bay area. Frequencies of occurrence of various synoptic circulation patterns as well as statistical estimates of wind speed and direction for each pattern are given. The seasonal variation of the wind climate is investigated. Prototype wind data used in this study are comprised of 15 years of long-term data from New Orleans and Lake Charles and 1 year of data measured (Continued)		

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20. ABSTRACT (Continued).

within the Atchafalaya Bay. Some shipboard observations are included as well. Statistical information includes frequencies of occurrence, estimates of duration, and historical extremes.

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PREFACE

This report presents an analysis of the wind climate within the Atchafalaya Bay, Louisiana. This study was supported as a reimbursable project within the Estuaries Division, Hydraulics Laboratory, US Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, for the US Army Engineer District, New Orleans, Louisiana.

The study was conducted under the direction of the following WES personnel: Messrs. H. B. Simmons, Chief of the Hydraulics Laboratory (Retired); F. A. Herrmann, Jr., Chief of the Hydraulics Laboratory; R. A. Sager, Assistant Chief of the Hydraulics Laboratory; W. H. McAnally, Jr., Project Manager; and J. V. Letter, Jr., Task Coordinator. This study was performed by Mr. Bruce A. Ebersole, formerly of the Wave Dynamics Division (WDD), Hydraulics Laboratory, under the direct supervision of Dr. R. W. Whalin and Mr. C. E. Chatham, Jr., former and acting Chiefs of WDD. The WDD and its personnel were transferred to the Coastal Engineering Research Center (CERC), WES, on 1 July 1983, under the direction of Dr. R. W. Whalin, Chief of the Coastal Engineering Research Center.

Commanders and Directors of WES during the study and the preparation and publication of this report were COL John L. Cannon, CE, COL Nelson P. Conover, CE, COL Tilford C. Creel, CE, and COL Robert C. Lee, CE. Technical Director was Mr. F. R. Brown.

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CONVERSION FACTORS, US CUSTOMARY TO METRIC (SI)
UNITS OF MEASUREMENT

US customary units of measurement used in this report can be converted to metric (SI) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
feet	0.3048	metres
knots (international)	0.514444	metres per second

THE ATCHAFALAYA RIVER DELTA

WIND CLIMATOLOGY

PART I: INTRODUCTION

1. This task of the Atchafalaya Bay investigation is an investigation of the different wind conditions that typically influence the Atchafalaya Bay system. Wind fields play an important role in determining the hydrodynamics not only within the bay itself but also in those portions of the Gulf of Mexico that surround the bay. Along with astronomically induced currents and riverine discharges, wind-induced currents, as a result of shallow depths existing in the bay, dictate the response of many physical processes within this system. These processes include: (a) hydrodynamic circulation patterns, (b) flooding and drying of marshes, (c) dispersion and deposition of sediments, (d) distribution of fresh and salt water, and (e) dispersion of any pollutants that enter the system. In addition, winds dictate the wave climate in this area. Both short-period, locally generated waves as well as longer period waves, propagating into this region from the Gulf, have the capability to redistribute sediments. There is a definite need to both quantitatively and qualitatively describe the characteristics of the wind fields within this bay system. The role of the wind climatology task in the Atchafalaya Bay investigation is described by McAnally and Heltzel (1978).

2. Most conventional wind analyses rely only on an estimation of statistical parameters to describe the wind fields. These statistical estimates are usually derived from an analysis of a set of prototype wind data, normally speed and direction, under the assumption that all wind conditions belong to one homogeneous population of events. This kind of model can yield very useful information; however, additional insight can be gained by categorizing the circulation patterns associated with daily weather conditions into different synoptic scale events and then examining the wind fields associated with each type of event. In this way, a more homogeneous population of statistical events is assured. Byrne et al. (1977) used this approach in an analysis of the precipitation within this same Atchafalaya Bay system. Wax (1977) studied the variation of water-surface elevations as a function of the sequence of occurrence of different synoptic scale circulation patterns. This study combines

wind-field statistics with information on weather pattern variations in order to form a statistical-climatological model to describe wind conditions within the Atchafalaya Bay area.

3. In addition to a breakdown by synoptic type, the wind analysis is categorized into four seasons. The winter season is chosen to include December through February; the spring season, March through May; the summer season, June through August; and the fall season, September through November. The purpose of this additional discretization is to examine whether or not the frequency of occurrence of each synoptic type and its associated winds changes during a typical year. Evidence of such a seasonal variation was presented in the work by Byrne et al. (1977) and Wax (1977). It is important to note that any seasonal change indicates a climatic variation with a time scale which is larger than that of the synoptic events. The causes of this larger scale of change will not be examined in this study.

PART II: DATA BASE

4. An extensive set of prototype data is required to relate certain sets of wind conditions to particular synoptic scale events within a seasonal framework. A minimum of 1 year of continuous data is essential for this type of study with additional years being optimal. Prior to October of 1981, sporadic wind data were recorded in the Atchafalaya Bay area, primarily for use in testing the weather stations and for use in other aspects of the overall project objectives. Beginning in October 1981 and extending through September 1982, a comprehensive plan to collect wind information within the bay was undertaken.

5. Weather stations were installed at the three locations shown in Figure 1. Exact elevations and locations of the anemometers, in terms of latitude and longitude, are shown in Table 1. Two anemometers were installed at each site, one at approximately a 5-m elevation and the other as close to 10 m as possible. The lower anemometer was installed primarily as a backup for the upper one. These three locations were chosen in order to obtain reasonable spatial coverage of the wind information gathered within the bay. The exact anemometer sites selected were dependent upon the availability of suitable structures upon which the weather stations could be installed. It was anticipated that this configuration could lend insight into the spatial variability of the winds within the bay. However, it also was anticipated that continuous data could not be recorded at all three locations. Therefore a second priority was to record as nearly a continuous record as possible at weather station E, since this station was more or less centrally located.

6. As expected, due to instrument failure, servicing difficulty resulting from logistics problems, and "unkind" weather, continuous data were not recorded at all three locations. Figure 2 shows, in a calendar format, all the data that were collected at each of the six anemometer positions. It should be noted that the secondary objective, continuous data at station E, was essentially met. During the winter and spring seasons, the availability of data was quite good; but for the other two seasons the amount of data taken was considerably less. By using some data taken during the summer of 1981, sufficient records were obtained for both of these seasons as illustrated by the following percentages.

<u>Season</u>	<u>Percentage of Season During Which Usable Data Exist</u>
Winter	96
Spring	92
Summer	52
Fall	69

7. Data taken at each anemometer included wind speed, wind direction, and the standard deviation of direction. All three of these measurements were computed using a 20-min average and were recorded every 20 min. Some of the data taken were not of a usable quality because the anemometers experienced a few mechanical problems during the course of the data-gathering experiment, particularly during electrical storms. Figure 2 also shows the times for which data were recorded but subsequently found to be erroneous. These times are designated by crosshatched areas.

8. Other sources of data were used in the formulation of the statistical-climatological model. In order to determine the long-term wind characteristics of this region, wind data recorded by the National Weather Service at Lake Charles and New Orleans, Louisiana, were used, since many years of data recorded at these two sites are available. Prior to the early 1960's, the locations and elevations of these anemometers changed frequently and it was decided to only use data recorded since that time; the anemometer at Lake Charles remained fixed at an elevation of 22 ft* after May of 1962 and the anemometer at New Orleans remained at 20 ft after December of 1960. These data consisted of measurements of wind speed and direction every 1 or 3 hr and were available from the starting dates listed above through 1975. It was believed that 10 to 15 years of data was sufficient to determine long-term wind characteristics.

9. One other data source was used to illustrate the long-term trends of the wind fields within this area. These data consisted of wind observations reported by ships in the Atchafalaya Bay area and northern Gulf of Mexico adjacent to the bay. More precisely, they included observations within a 1-deg-latitude by 1-deg-longitude block extending from 28 deg north to 29 deg north

* A table of factors for converting US customary units of measurements to metric (SI) units is presented on page 3.

and from 91 deg west to 92 deg west that were collected during the years 1956 to 1975. These observations were also compiled by the National Weather Service and were used in the study since they were readily available. It is important to note that these measurements, since many were visual observations, are far less accurate than those recorded by anemometers.

10. The final source of data used in this study was the publication "Daily Weather Maps" issued by the Environmental Data and Information Service of the National Oceanic and Atmospheric Administration (US Department of Commerce). This information was used to define the type of synoptic weather pattern causing the circulation of air within the study area on a daily basis. These maps were available for every day during the prototype data collection effort.

PART III: DATA ANALYSIS AND MODEL FORMULATION

11. The first step in the formulation of the statistical-climatological model was to devise a method of categorizing day-to-day circulation into various synoptic scale types based on certain dynamical characteristics particular to each type. The classification criteria that were adopted follow those used by Muller (1977) and Byrne et al. (1977) but with some exceptions. They stratified the weather into eight all-inclusive categories. In this study, two of their types were combined and two others were modified, resulting in a total of seven.

12. Two of the synoptic types deal with the passage of fronts through the area. The first situation, called Frontal Overrunning (FOR), is associated with the passage of a southerly or southeasterly moving cold front. This event usually precedes the west to east progression of a high pressure cell across the continental United States and is characterized by a period of steady winds, usually from southerly directions, that is suddenly interrupted by a rapid increase in wind speed and a switch in direction to winds from the north (Figure 3). Figure 4 shows the time-history of winds encountered during the passage of that cold front over the Atchafalaya Bay.

13. A second synoptic event associated with frontal activity is the Frontal Gulf Return (FGR) situation and is characterized by a northerly moving warm front or by the progression of a weak-to-moderate strength low pressure cell from southern Texas toward the northeast. Steady wind flow prior to the frontal passage is broken by a change in wind direction to winds from southeast through southwest directions. This change in wind direction and speed can often be quite abrupt especially in the case of a low pressure cell passage. An example of a more gentle shift in winds associated with a warm front passage is shown in Figures 5 and 6.

14. Both of these passages also cause noticeable changes in the quality of the air itself. Overrunning of a cold front brings colder, dryer air from the north into the area while a warm front brings with it warmer, moister air from the northern Gulf. The time scales associated with these two phenomena are about the same; each usually lasts between 6 and 24 hr depending upon the forward speed of the front.

15. Another type of circulation that can have high wind conditions with widely changing direction is the infrequent passage of an intense low pressure

center called a Gulf Tropical Depression (GTD). This weather type is comprised of a small low pressure center with tightly spaced isobaric contours and high winds and occasionally affects this area, especially during the late summer months. Hurricanes and intense tropical storms fall into this category. These events are considered separately due to their intensity and infrequent occurrence.

16. The remaining synoptic types are associated with the movement and position of high pressure cells relative to the continental United States and have time scales ranging from hours to days. The first of these types to be considered is called a Continental High (CH) situation. In this study, this type will include both the CH and Pacific High (PH) patterns classified by Byrne et al. (1977). Airflow during these conditions is steady and directed from northwest through northeast directions. Fair, dry, cooler air generally characterizes this circulation which is associated with a clockwise rotation around a high pressure center located over the central and western United States or southern Canada. Figure 7 shows this synoptic pattern, and Figure 8 shows the associated time-history of wind speed and direction measured in the Atchafalaya Bay during this event.

17. A second type, Coastal Return (CR) flow, occurs when these same high pressure systems reach the eastern coast of North America or even move out into the western reaches of the Atlantic Ocean. With this progression, the winds shift from northerly directions to those with primarily eastern components. During winter and spring, this circulation pattern represents colder air modified by short passages over the Atlantic Ocean and northern Gulf as shown in Figure 9. During summer and fall, this includes the Bermuda High situation in which a band of tropical air extends eastward from the southeastern United States far into the Atlantic Ocean; and again, flow is essentially from the east. Figure 10 shows typical wind conditions during a winter coastal return flow of air.

18. When a high pressure system moves still farther eastward out over the Atlantic Ocean, the winds shift from the east to the south resulting in what is called Gulf Return (GR) airflow. These winds bring moist tropical air from the Gulf of Mexico into the area. GR circulation is illustrated in Figure 11 and the accompanying prototype observations are shown in Figure 12. This particular air circulation also can occur after the passage of a warm front or low pressure center once the winds have become fairly steady.

19. The final synoptic scale weather pattern to be considered is the Gulf High (GH) condition in which a high pressure cell is displaced over the northern Gulf. During the eastward passage of this "high," winds are usually rather weak and change in direction from northwest to west to southwest and they bring warmer, dryer air from southern Texas and Mexico. An example of this weather pattern is shown in Figure 13 and the measured winds are shown in Figure 14.

20. Having broken the weather patterns into separate types based on dynamical considerations, the next step was to determine which synoptic pattern was influencing the Atchafalaya Bay area during the times that data were recorded. This was done using daily weather maps in conjunction with measured data. Sudden changes in wind speed and/or direction as well as changes in the standard deviation of wind direction were used to define the transition from one weather type to another. Using all available prototype data, the frequency of occurrence of each synoptic scale type, within the seasonal framework mentioned earlier, was computed. These estimates are shown in Table 2. Results found by Byrne et al. (1977) for New Orleans and Lake Charles can be grouped into this seasonal framework for comparison. Their findings also are shown in Table 2.

21. A few points should be remembered when comparing the results of Bryne et al. (1977) with those of this study. Differences in definitions of the synoptic types (defining the beginning and end of FOR and FGR frontal weather patterns) make comparisons difficult. In addition, the PH circulation type described by Byrne et al. (1977) has been combined with the CH type. Despite these differences, many conclusions about the variation in circulation affecting this area can be formulated and are shown to be substantiated by both sets of results.

22. Winter is dominated by the CH and FOR circulation types which are both characterized by northerly winds. During the 1981-82 winter season, there seemed to be about 10 percent less of these northerly wind conditions than "usual" (49 percent in the Atchafalaya Bay versus 60 percent and 59 percent using the long-term data at Lake Charles and New Orleans). The difference was made up by an increase in CR and GR circulation. Note the sum of the frequencies of FGR and GR for all three data sets. They are nearly identical and indicate that the occurrence of this kind of airflow was about normal for this season. The discrepancies in the individual frequencies of

occurrence of FGR and GR are due to differences in determining the start and end of individual weather patterns.

23. During the spring season, the difference in northerly winds between 1982 and typical years is even more obvious and is again compensated by a large increase in CR circulation and a slight increase in the GR-FGR type of airflow. As with the winter season, the GH and GTD activity during the spring is very small.

24. This trend of decreasing northerly winds continued into the summer of 1982. Once again, the CR circulation has increased as has the airflow into the area from the Gulf. Results during the summer of 1982 may be biased because of the lack of data taken over the entire season. Compared with the long-term results, there seems to be about a 15 percent increase in winds from the south as well as a 5 percent decrease in winds associated with the GH circulation. In addition, GH airflow only becomes important during the summer and the frequency of occurrence of GTD's during this one summer is less than usual.

25. The fall season of 1981-82 was very typical in terms of the distribution of the occurrence of the different synoptic weather patterns. The percentages of CH and FOR wind conditions as well as CR and GR-FGR circulation are almost identical with the percentages found using the results of Byrne et al. (1977). The only major difference is a decrease in the frequency of occurrence of the GTD events.

26. In general, the 1981-82 year in the Atchafalaya Bay area experienced fewer than normal northerly wind conditions. This decrease was accompanied by slight increases in both easterly and southerly winds, and it appears that high pressure systems were able to move across the continent faster. The other major difference, mentioned earlier, is the lack of occurrence of already rare events--the intense tropical storms.

27. Up to this point the "climatological" aspects of the model have been discussed. These include the categorization of weather circulation into separate synoptic types and an analysis of the frequency of occurrence of each type during the year as a whole and during the four seasons that comprise the year. The remainder of the report will deal with wind data that were recorded, manipulation of the data, statistics that were computed, and relations between statistical findings and "climatological" information. One point must be addressed that deals with a key assumption of the model.

28. Due to the size of the Atchafalaya Bay, in relation to the spatial extent of all the synoptic weather types except tropical storms, which will not be discussed very much due to their infrequent occurrence, wind conditions over the entire area were assumed to be relatively constant in terms of both wind speed and direction. Figures 15 and 16, and 17 and 18, show a comparison of the measured wind speeds and directions at weather stations E and B, and E and D, respectively. Winds at each site were recorded on the upper anemometers, which are at elevations within 1 ft of each other. In both instances, wind speeds are within 2 m/sec or 4 knots of each other. Wind directions at E and D are within 20 deg of each other and the direction measurements at E and B are within about 40 deg of each other. There is some evidence that these directional differences may represent a bias. Nevertheless, differences were assumed to be negligible and the supposition of constant wind fields over the entire Atchafalaya Bay was assumed to be true.

29. A vast amount of data was used to generate wind statistics for the Atchafalaya Bay area. Table 3 shows a breakdown, by season, of the number of paired observations of wind speed and direction that were utilized. Statistical information derived from data recorded at Lake Charles, New Orleans, and from ships observations can only be used in a gross sense, such as testing whether or not the distributions of wind speed and direction measured during the 1 year in the Atchafalaya Bay reflect "typical" conditions for this area. Without relating the long-term data directly to the atmospheric circulation on a day-to-day basis, the long-term data can only be used to make inferences about the relations between gross wind statistics measured during 1981-82 and the long term.

30. Before analysis, the data were adjusted to specified formats. Long-term data at the National Weather Service stations were recorded in whole knots and in direction bands for wind speed and direction, respectively. Sixteen bands were used with 22.5 deg in each band. Band number 1, which is centered about 0.0 deg, indicates winds blowing from due north; and increasing bands in the clockwise direction denote increasing wind angles. For example, band number 5 indicates winds blowing from the east at 90 deg and band number 9, winds from the south at 180 deg.

31. Data recorded in the Atchafalaya Bay during 1981-82 were measured in decimal metres per second and decimal degrees. They also were recorded at various elevations dependent upon the anemometer location. Therefore, for

comparison purposes, wind speed data were all converted to a common elevation (10 m) using the following expression given in the Shore Protection Manual (US Army Coastal Engineering Research Center 1977);

$$U_{10} = \left(\frac{10}{Z} \right)^{1/7} U_Z \quad (1)$$

where U_{10} is the equivalent 10-m wind speed for a measured wind speed, U_Z , recorded at an elevation Z (where Z is in metres). The equivalent 10-m wind speed was then converted to knots. The measured wind directions were assumed to be invariant between the measured elevation and the 10-m elevation and were converted to the 16-band scale mentioned above. In this way, comparisons between statistics computed from the measured data set and the long-term results could be made more easily.

32. The data at Lake Charles were measured at an elevation of 22 ft (6.7 m), and the data at New Orleans, at 20 ft (6.1 m). According to Equation 1, wind speeds at Lake Charles are 6 percent less than their equivalent 10-m values and at New Orleans they are 7 percent less. In the statistical tables for these two sites (Tables 4-11), no compensation for elevation was made in order to avoid difficulties in the presentation of results. However, in the plot comparisons (Figures 19-28), long-term results were properly shifted along the velocity axis. Wind directions at Lake Charles and New Orleans were again assumed not to be a function of elevation. Ships observations, since they had no vertical control, were analyzed and presented as recorded.

33. Tables 4-15 show the bivariate distribution of wind speed and direction, by season at New Orleans, Lake Charles, and Atchafalaya Bay. Figures 19-26 show comparison plots of the one-dimensional frequency of occurrence of both speed and direction, again by season, and include analysis results using ships observations.

34. The frequency of occurrence of wind speeds from all three long-term sources show spikes at multiples of 5 knots. This is obviously due to the fact that a number of recorded observations (such as most of the ships observations) were made by visual inspection or guesswork and not from instrument recordings. For these same ships observations, it is apparent that for wind direction a rougher 8-point scale was utilized most of the time. Therefore results inferred from this particular data source should be used only to

describe generalized trends in the data and not for any detailed analysis.

35. There also appear to be different thresholds for lower values of wind speed recorded at the National Weather Service stations. Nothing less than 1 knot was recorded at New Orleans and nothing less than 2 knots was measured at Lake Charles. These differences, since they occur at the lower end of the wind speed spectrum, are not of great importance. A problem also appears to exist with the anemometers used in the Atchafalaya Bay. They do not seem to be able to differentiate wind directions from about 5 to 10 deg on either side of due north. This is apparent in the data analysis from the lack of observations in direction band 1. This discrepancy must be recognized since it does pose a problem.

36. Referring to the comparison plots, Figures 19 and 20 in particular, it appears that the 1981-82 winter season was quite typical in terms of the wind speeds encountered; however, in terms of direction, there are some differences. There is a decrease in winds from the northernmost directions and an increase in the frequency of winds from the east through the southeast directions. This supports earlier observations concerning the differences in the occurrence of the synoptic weather types between the 1981-82 measurement year and the long-term results.

37. During the spring season of 1982, winds in the Atchafalaya Bay area were not as strong as typically expected except for very large wind speeds, above 20 knots. Again in the wind direction plot, there is a decrease in northerly winds and an increase in easterly winds over "typical" conditions. The large "spike" of winds from the south measured at New Orleans and Lake Charles is not explainable. This also was apparent during the winter season. It might be a remnant of visual observations. Also, note the shift in dominant wind directions from northerly winds to southeasterly winds which again is supported by the findings concerning changes in the frequency of occurrence of the synoptic scale events from winter to spring.

38. During the summer of 1982, wind speeds again seem to be quite normal although their magnitude, in general, has substantially decreased compared with those typical of winter and spring seasons. Winds also are fairly normal in terms of their directional distribution and are shifting from the southeast to the south, which is accompanied by a decrease in winds from the north. Note the effect on wind direction as a result of GH circulation (increased westerly winds).

39. Wind speeds measured during the fall of 1981 and 1982 are slightly larger than those to be normally expected, as indicated by an increase in winds in the 10- to 15-knot range. The distribution of wind direction is very typical for this season which again agrees with the information presented in Table 2. Winds, in general, also are shifting back to northeasterly directions as a result of an increase in CH and FOR circulations.

40. Figures 27 and 28 show the one-dimensional frequency of occurrence of both speed and direction for the entire year in Atchafalaya Bay as well as "average years" in this region, as represented by the cumulative longer term statistics computed from New Orleans and Lake Charles data. Wind speeds measured in the bay during 1981-82 are typical but the distribution of wind direction is slightly different. These cumulative statistics, without regard for synoptic variation, can be very useful in: (a) understanding the overall effects of the seasonal variation in wind conditions, (b) substantiating findings in the Atchafalaya Bay using longer term data, and (c) estimating wind conditions that can be expected in the future.

41. Tables 16-40 contain the bivariate distributions of wind speed and direction, by season and by synoptic weather type, for data recorded in the Atchafalaya Bay during the 1981-82 measurement year. These tables are designed to show wind conditions associated with each of the synoptic circulation patterns defined earlier. They also can be used to examine the seasonal variation of wind conditions for a particular synoptic event. Care must be exercised when applying conclusions drawn from these tables to times other than the measurement year. Caution should be used concerning the frequency of occurrence of that synoptic type during a particular season and how that frequency compares with the expected frequency during the same season in other years. In addition, especially during the summer and spring seasons, it is important to note the number of wind speed-direction pairs that were considered in a particular bivariate distribution. Results presented can be very useful; however, their limitations should be understood. The tables are grouped in the following manner. There are four tables for each synoptic type except the Gulf Tropical Depression (there is only one table). The order of synoptic types is: Continental High, Frontal Overrunning, Coastal Return, Gulf Return, Frontal Gulf Return, Gulf High, and Gulf Tropical Depression. Four tables for each type, one for each season, are ordered in this way: winter, spring, summer, and fall.

42. Tables 16-19 are for the CH circulation pattern. During all four seasons this airflow is characterized by potentially high winds out of the northwest through the northeast directions. The highest winds occur during winter and spring and they drop off in magnitude during the summer. During all four seasons, the dominant direction is from the northeast. Tables 20-23 show the bivariate distributions for FOR conditions that are again characterized by high winds which can be quite variable in both speed and direction. Dominant directions also are from the north or northeast and are associated with winds during the latter stages of the frontal passage. Again, like the CH situation, during the summer the magnitudes of the winds during this weather type are smaller.

43. Circulation during the next type considered, the CR flow, is from the northeast through the southeast directions with the dominant direction being from due east. Accompanying this type of weather pattern are winds that are steady in both speed and direction. Winds can be quite large. A decrease in wind magnitude also is apparent during the summer and fall months. The seasonal variation in this synoptic type is shown in Tables 24-27.

44. The GR flow, shown in Tables 28-31, is characterized by steady winds from the east through the southwest directions. In general, wind speeds are less than those found during coastal return airflows. There does not appear to be a decrease in wind speed during the summer for this type, which was the case for previous types.

45. Wind conditions during FGR flow, in Tables 32-35, are characterized by variable winds changing to steady winds blowing from the southeasterly through the southwesterly directions. These steady winds appear to be of low to moderate speeds except during the winter when they can become quite strong. In addition, variable winds often experienced during the initial stages of a warm front passage can be large.

46. GH circulation, shown in Tables 36-39, typically involves a rotation of winds from north to west to the south as the high pressure cell, which is centered in the northern Gulf, migrates eastward. The dominant wind direction is out of the southwest and winds are usually light. As mentioned earlier, this type of circulation only becomes prevalent during the summer months.

47. The remaining circulation pattern is the GTD. Table 40 shows the winds that accompanied the single intense low pressure system which passed

through this general area and was recorded. In this instance, winds were not as variable as they might have been had the center of the system passed directly over the bay. Here winds were predominantly from the south, which indicates passage of the system to the west of the study area. The important feature of this synoptic type is the potentially high winds that can accompany these intense storms.

48. The series of Figures 29-53 are in the same order as the previous series of tables. These plots contain estimates of the duration of wind speed by synoptic type and by season where duration is defined to be the persistence of a certain wind speed once that wind speed has been exceeded. There are two curves on each plot, one for the average duration and one for the maximum duration encountered. The same cautions should be remembered when using these results as were given for the bivariate information. These duration statistics can be very helpful in determining estimates of the average and maximum durations of a particular synoptic type during a certain season as well as the durations of different wind speeds during a particular type of circulation. Figures 54-57 illustrate the duration statistics computed for each season, but in this case all the synoptic weather patterns are combined.

49. The final information presented is a list of wind speed maxima by direction band and by season using the long-term data at New Orleans and Lake Charles (shown in Tables 41-44). Extreme tropical storms have been deleted from this data set; however, this information is useful in determining the expected extreme wind conditions during a year in terms of direction for the other synoptic types. These can be compared with those extremes measured during the data-gathering experiment in the Atchafalaya Bay to determine whether or not typical extreme wind conditions associated with the synoptic weather types were measured. A frequency of occurrence analysis also could be performed on these wind speeds in order to determine future extreme values.

PART IV: SUMMARY

50. Wind data were gathered extensively within the confines of Atchafalaya Bay for a period of 1 year, which started in October 1981 and continued until October 1982. The amount of usable data was extremely large during the winter and spring seasons and sufficient during the summer and fall of 1982. A large amount of data from other sources, namely the National Weather Service stations in Lake Charles and New Orleans and a compilation of observed-from-ships wind conditions in this immediate area, was assembled and analyzed. Statistical estimates were used to express wind conditions in terms of speed and direction. These statistics were then related to the different kinds of weather patterns that influence this region by categorizing these patterns into seven all-inclusive types with each defined by a particular set of dynamical characteristics. In this way, the variations in wind conditions were better related to the climatological forcing that induced these variations.

51. Information was provided on the frequency of occurrence of wind conditions both with and without regard to their causative factors. The latter results were used to substantiate those results found using the statistical-climatological approach. Estimates of the duration of these different weather patterns as well as estimates of the persistence of winds common to each pattern were computed. Finally, information concerning extreme wind conditions that can be expected to occur in any given year was presented using the long-term historical data that were available. Using this information, the variations in the physical processes within the bay that are strongly dependent on the local wind conditions can be better understood and predicted.

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Table 1
Exact Locations and Elevations of
the Atchafalaya Bay Anemometers

<u>Station</u>	<u>Elevation</u>		<u>Latitude</u>	<u>Longitude</u>
	<u>ft</u>	<u>m</u>		
WS-B(U)	29.0	8.85	29°36'N	91°42'W
WS-B(L)	19.0	5.80	29°36'N	91°42'W
WS-D(U)	28.0	8.55	29°27'N	92°25'W
WS-D(L)	16.5	5.05	29°27'N	91°25'W
WS-E(U)	28.5	8.70	29°23'N	91°32'W
WS-E(L)	23.0	7.00	29°23'N	91°32'W

Table 2
Frequency of Occurrence, in percent
by Synoptic Weather Type

<u>Location</u>	<u>Season</u>	<u>PH</u>	<u>CH</u>	<u>FOR</u>	<u>CR</u>	<u>GR</u>	<u>FGR</u>	<u>GH</u>	<u>GTD</u>
Atchafalaya Bay (1981-1982)	Winter		29	20	15	22	9	4	0
	Spring		18	10	22	44	5	1	0
	Summer		7	11	14	39	7	23	0
	Fall		33	22	16	19	3	5	3
	Year		22	16	17	31	6	8	1
Lake Charles (1971-1974)	Winter	11	22	27	10	15	16	0	0
	Spring	9	22	14	10	26	16	2	0
	Summer	0	17	8	11	24	5	32	4
	Fall	7	28	19	15	15	9	2	8
	Year	7	22	16	12	20	11	9	3
New Orleans (1966-1975)	Winter	6	25	28	9	13	17	2	0
	Spring	6	20	15	11	27	18	3	0
	Summer	0	17	6	12	23	8	27	7
	Fall	4	34	15	16	12	10	4	6
	Year	4	25	16	12	18	13	9	3

Table 3
Number of Wind Observations
(Speed and Direction Pairs)

<u>Location</u>	<u>Season</u>				<u>Total</u>
	<u>Winter</u>	<u>Spring</u>	<u>Summer</u>	<u>Fall</u>	
Lake Charles* (1962-1975)	12,391	13,325	13,069	13,237	52,022
New Orleans* (1960-1975)	20,174	20,921	18,671	17,709	77,475
Atchafalaya Bay** (1981-1982)	12,170	11,344	3,847	6,371	33,732
Ship observations	4,438	4,713	5,274	4,708	19,133

* Hourly and 3-hourly observations.

** Twenty-min observations.

Table 4

NEW ORLEANS

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WINTER SEASON (DEC TO FEB)										20174 HOURLY OBSERVATION PAIRS										
WIND SPEED (KNOTS)	DIRECTION BAND										TOTAL									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	14			
2	34	16	23	30	25	21	10	8	13	14	15	16	23	9	17	17	299			
3	49	36	50	61	47	41	22	17	21	23	25	36	36	18	18	34	541			
4	66	56	76	91	69	51	38	41	42	37	44	35	50	22	14	49	787			
5	83	82	93	104	75	53	47	50	71	55	38	27	44	30	28	45	932			
6	102	90	105	119	85	66	65	68	75	44	45	38	39	36	30	47	1061			
7	194	97	96	110	73	68	61	61	77	44	34	25	37	37	43	54	1018			
8	104	98	99	83	69	51	57	63	83	35	41	33	37	36	45	65	1007			
9	185	82	83	67	57	36	45	49	57	28	22	20	20	26	28	54	1766			
10	122	84	78	65	46	39	46	51	66	27	25	16	32	34	41	95	875			
11	82	46	48	41	28	20	23	34	46	17	15	11	22	22	28	57	538			
12	104	71	46	40	36	17	29	43	44	24	16	10	20	22	44	81	655			
13	82	46	26	21	18	9	21	31	31	13	13	10	15	18	21	46	433			
14	50	31	17	12	6	4	12	22	24	14	11	5	11	10	25	39	303			
15	53	27	11	10	5	6	8	18	27	12	6	3	7	9	20	35	270			
16	34	9	6	5	5	2	6	16	14	9	6	2	4	6	14	22	169			
17	21	8	1	3	4	4	2	10	7	7	6	3	5	5	9	12	113			
18	20	6	3	3	1	1	1	5	5	6	2	1	4	4	10	12	99			
19	5	0	0	1	0	0	0	2	4	1	0	0	1	0	2	4	27			
20	7	5	1	0	0	0	0	1	5	1	1	0	2	2	2	6	47			
21	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8			
22	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	11			
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4			
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5			
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3			
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
TOTAL	1213	900	874	881	664	521	510	593	722	429	372	304	424	348	451	786				

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.1 METER ELEVATION.

Table 5

NEW ORLEANS

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WIND SPEED (KNOTS)	SPRING SEASON (MAR TO MAY)										20921 HOURLY OBSERVATION PAIRS										TOTAL
	1	2	3	4	5	6	7	8	DIRECTION BAND		11	12	13	14	15	16					
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4				
2	31	22	16	21	20	9	6	6	12	10	21	26	39	14	0	23	302				
3	42	23	40	57	50	32	13	8	21	28	30	40	58	27	17	28	535				
4	62	40	46	74	54	59	34	24	39	43	55	54	70	38	29	34	757				
5	62	53	56	61	54	81	72	46	62	64	84	40	47	39	29	30	888				
6	97	75	52	62	58	92	95	79	82	84	72	39	32	39	27	38	1031				
7	82	75	83	54	48	81	102	113	115	75	66	46	26	28	25	44	1069				
8	84	73	70	56	44	82	107	123	151	63	55	29	20	25	22	44	1055				
9	58	50	43	38	35	54	79	104	119	45	30	16	14	10	15	31	749				
10	71	42	50	45	45	68	82	117	149	63	44	21	15	20	27	44	911				
11	41	31	30	29	23	27	55	78	116	27	21	14	6	11	11	28	556				
12	52	38	34	35	29	32	52	91	120	40	28	14	14	11	18	35	651				
13	35	29	22	21	15	26	34	72	86	31	10	14	7	9	15	24	458				
14	25	18	19	13	18	14	20	52	63	21	7	9	10	10	15	21	342				
15	17	15	14	11	16	7	21	43	48	17	6	8	7	9	16	21	273				
16	4	3	4	3	5	3	10	30	35	8	3	4	5	6	9	8	151				
17	3	1	4	2	4	1	4	21	21	6	1	3	4	4	7	8	97				
18	2	1	1	2	2	1	6	16	12	5	1	2	5	5	1	2	73				
19	0	0	0	0	0	1	2	5	10	2	0	0	2	2	0	0	26				
20	1	0	0	0	0	1	2	5	8	2	0	0	0	0	1	0	29				
21	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	11				
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3				
23	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2				
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4				
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
TOTAL	780	602	592	595	519	684	808	1048	1287	645	543	386	394	314	322	474					

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.1 METER ELEVATION.

Table 6

NEW ORLEANS

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WIND SPEED (KNOTS)		SUMMER SEASON (JUN TO AUG)										18671 HOURLY OBSERVATION PAIRS																TOTAL
		1	2	3	4	5	6	7	8	DIRECTION BAND		11	12	13	14	15	16											
1	0	0	1	2	1	0	0	0	0	0	0	1	0	0	0	0	1	9										
2	66	40	58	48	48	27	10	13	26	22	32	58	80	59	46	1	693											
3	99	56	66	82	72	53	29	18	35	52	91	103	193	109	70	53	1223											
4	100	57	80	83	98	80	42	47	86	106	155	141	187	103	68	88	1511											
5	111	78	81	71	61	76	86	67	118	145	181	130	130	86	71	71	1511											
6	97	86	100	59	53	57	72	101	131	134	144	98	73	64	41	59	1552											
7	91	77	87	55	38	45	66	91	119	109	103	68	51	52	27	60	1377											
8	69	59	83	50	35	41	57	76	110	78	85	64	40	31	24	45	1146											
9	30	38	40	26	16	15	23	47	61	40	38	38	25	12	12	30	953											
10	25	27	31	26	21	18	29	39	52	28	34	24	18	14	8	13	498											
11	11	11	18	19	8	8	9	19	28	17	17	17	11	8	5	5	213											
12	8	6	10	10	10	8	11	20	33	19	16	16	7	5	2	2	181											
13	3	5	7	6	6	3	6	10	17	5	5	8	3	2	1	1	95											
14	2	3	2	5	2	3	3	6	10	3	3	6	5	1	0	0	61											
15	0	2	0	2	1	0	2	2	4	2	3	3	3	0	0	0	25											
16	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	16											
17	1	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	9											
18	0	1	0	0	0	0	0	1	1	0	2	1	0	0	0	0	6											
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
TOTAL	719	556	672	551	480	441	454	567	840	758	919	784	831	554	359	507	0											

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.1 METER ELEVATION.

NEW ORLEANS

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND) BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH BY INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE). THE WIND SPEED IS THAT MEASURED AT A 6.1 METER ELEVATION.

Table 8

WIND SPEED (KNOTS)		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																12391 HOURLY OBSERVATION PAIRS																TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
		WINTER SEASON (DEC TO FEB)																LAKE CHARLES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		33	34	35	36	37	38	39	40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.7 METER ELEVATION.

Table 9

LAKE CHARLES

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

SPRING SEASON (MAR TO MAY)										13325 HOURLY OBSERVATION PAIRS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
WIND SPEED (KNOTS)	DIRECTION BAND										TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.7 METER ELEVATION.

Table 10

LAKE CHARLES

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

SUMMER SEASON (JUN TO AUG)		13069 HOURLY OBSERVATION PAIRS																TOTAL	
WIND SPEED (KNOTS)		DIRECTION BAND																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	49	28	34	50	51	24	29	35	52	27	25	28	35	28	33	17	550		
3	103	82	133	169	139	117	130	107	188	100	136	104	126	97	80	56	1872		
4	75	61	130	179	174	122	162	135	257	122	155	116	100	65	71	39	1970		
5	40	45	85	136	110	101	101	74	195	120	127	170	69	59	46	29	1414		
6	28	38	65	97	90	67	63	51	169	129	114	56	46	44	26	22	1112		
7	28	19	37	68	69	44	37	48	126	107	110	48	41	36	16	16	857		
8	16	12	30	42	39	24	29	26	81	82	60	16	19	16	9	3	513		
9	13	15	32	35	41	32	32	42	117	140	105	27	22	17	11	7	695		
10	6	4	8	19	13	7	9	19	63	84	56	10	3	7	6	3	270		
11	3	3	1	1	3	4	7	13	35	43	36	4	2	0	0	2	318		
12	3	3	1	2	1	1	7	13	16	23	15	6	0	0	0	1	169		
13	0	1	1	1	1	2	4	9	16	16	14	4	1	0	0	0	97		
14	0	2	0	1	1	5	1	3	6	10	4	3	0	0	0	0	77		
15	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	34		
16	0	0	0	0	0	0	0	0	2	2	1	2	0	0	0	0	11		
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10		
18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3		
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10		
20	0	1	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0		
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TOTAL		373	321	577	807	762	562	642	605	1379	1094	1001	508	474	378	307	202		

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.7 METER ELEVATION.

Table 11

LAKE CHARLES

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

FALL SEASON (SEP TO NOV)		13237 HOURLY OBSERVATION PAIRS																TOTAL
WIND SPEED (KNOTS)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	62	33	41	53	37	30	19	15	24	0	0	0	0	0	0	0	0	410
4	140	195	179	190	154	71	114	71	96	52	52	42	27	40	19	20	18	1427
5	130	100	172	221	182	115	120	86	111	62	62	49	33	34	27	53	56	1563
6	94	95	138	191	167	76	120	66	102	50	50	37	17	16	12	37	45	1269
7	82	91	133	132	129	88	58	54	77	50	50	38	8	19	19	24	38	1062
8	79	76	104	120	91	76	73	43	75	34	34	23	15	11	13	18	30	890
9	52	51	71	64	68	64	59	37	43	25	25	14	6	5	4	8	25	602
10	78	94	112	88	64	71	87	40	68	24	24	32	6	8	6	16	36	838
11	44	41	42	43	25	27	37	20	21	15	15	9	6	1	1	10	21	370
12	51	51	65	36	29	40	43	30	28	20	20	5	2	0	6	13	21	449
13	37	29	30	26	14	15	27	21	27	20	20	6	3	3	3	15	27	309
14	32	20	15	15	6	14	19	19	31	10	10	6	4	1	2	6	14	226
15	18	14	15	12	6	10	17	17	15	3	3	3	0	1	1	5	10	182
16	16	9	3	12	6	6	12	3	13	3	3	0	0	1	0	1	8	112
17	10	7	6	6	2	12	3	6	12	6	6	1	0	0	0	2	9	87
18	13	9	6	6	2	6	4	4	10	1	1	0	0	2	0	0	3	29
19	5	0	0	0	5	3	1	3	5	1	2	2	0	0	0	0	7	42
20	5	2	1	4	3	0	2	3	5	1	2	0	0	0	0	0	0	7
21	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	9
22	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
25	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		976	837	1146	1233	1001	732	846	556	769	407	290	143	159	153	295	451	

WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND)
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 6.7 METER ELEVATION.

Table 12

ATCHAFALAYA BAY

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE XI60)

WIND SPEED (KNOTS)	WINTER SEASON (DEC TO FEB)						DIRECTION BAND						12170 20 MIN OBSERVATION PAIRS						TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
0-1	0	0	6	10	13	19	15	14	13	10	4	9	11	8	4	157			
1-2	0	0	0	10	4	7	4	4	4	5	6	3	8	3	1	78			
2-3	2	9	12	14	18	12	19	15	9	5	6	6	9	12	12	173			
3-4	4	27	23	19	32	36	35	22	12	18	15	6	16	13	19	322			
4-5	6	45	46	46	59	50	54	40	42	22	34	20	28	18	35	574			
5-6	9	49	71	73	58	73	94	73	41	40	34	21	23	33	36	776			
6-7	16	62	77	68	73	111	118	87	58	44	27	26	21	27	47	914			
7-8	8	78	94	104	105	121	126	106	50	41	27	32	18	18	53	1034			
8-9	5	76	79	115	124	124	131	124	66	29	18	22	16	16	39	1064			
9-10	4	63	80	105	102	105	87	97	61	18	9	13	15	23	50	907			
10-11	3	68	55	82	105	78	56	78	63	20	11	9	8	25	40	756			
11-12	5	63	81	59	59	69	50	67	47	10	11	4	9	19	25	637			
12-13	1	76	87	60	50	51	29	28	5	5	6	8	10	13	22	548			
13-14	1	73	64	46	47	42	42	16	16	8	2	7	7	17	32	455			
14-15	7	65	69	27	48	18	40	6	5	5	5	4	6	13	20	393			
15-16	5	66	46	15	42	19	12	8	5	5	3	3	3	9	6	323			
16-17	2	48	30	6	32	15	7	3	2	2	9	3	3	9	23	250			
17-18	1	24	15	4	14	8	2	4	3	0	1	3	5	16	17	196			
18-19	0	18	8	5	6	3	4	1	0	3	4	5	5	6	23	149			
19-20	0	11	4	1	3	0	0	0	0	1	1	0	3	4	16	85			
20-21	1	11	4	0	3	0	0	0	0	0	0	3	2	11	11	70			
21-22	3	4	0	0	2	1	0	0	0	0	0	0	2	11	9	55			
22-23	0	4	2	1	0	0	0	0	0	0	0	0	0	4	2	43			
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8			
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
TOTAL	92	989	980	886	1012	977	954	811	537	304	255	219	244	337	557	837			

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES MEASURED CLOCKWISE.

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 13

ATCHAFALAYA BAY

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

11344 20 MIN OBSERVATION PAIRS																	
SPRING SEASON (MAR TO MAY)																	
WIND SPEED (KNOTS)	DIRECTION BAND																TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
0-1	2	3	5	6	16	26	21	10	18	14	8	6	7	3	5	1	158
1-2	0	4	11	15	19	17	23	10	7	18	8	8	2	6	4	2	163
2-3	0	8	16	34	29	30	40	26	24	28	8	12	8	4	6	3	283
3-4	1	27	45	58	59	55	72	77	44	40	18	10	11	7	9	9	550
4-5	0	58	66	71	115	97	112	111	63	29	24	22	14	10	14	14	826
5-6	6	48	62	104	131	133	131	166	79	31	19	28	15	18	13	16	1007
6-7	10	61	64	132	122	148	154	219	111	29	28	21	9	13	22	13	1163
7-8	7	44	59	139	111	163	149	224	108	17	21	16	7	8	11	17	1121
8-9	6	57	51	99	124	162	157	155	51	29	11	13	12	4	8	7	939
9-10	5	46	65	106	99	142	109	94	36	16	3	8	7	5	9	12	770
10-11	7	60	52	71	94	92	83	66	13	6	2	4	2	3	11	14	586
11-12	0	45	55	54	67	92	81	44	9	2	5	2	4	3	3	12	495
12-13	1	60	51	30	31	77	81	29	10	4	1	0	0	6	5	14	398
13-14	2	53	48	32	20	55	70	15	2	0	1	0	0	3	4	14	330
14-15	3	44	38	31	7	37	50	12	0	5	0	0	0	3	10	10	257
15-16	1	48	38	28	5	22	37	12	1	2	2	0	0	4	9	11	229
16-17	0	41	26	10	4	17	34	3	2	0	0	0	0	2	5	4	163
17-18	0	37	21	4	0	7	24	0	0	0	0	0	0	0	6	8	119
18-19	0	23	21	7	0	4	18	0	0	0	0	0	0	0	0	9	88
19-20	0	28	11	6	0	7	28	2	0	0	0	0	0	0	10	12	109
20-21	0	15	6	11	0	6	23	0	0	0	0	0	0	0	14	7	86
21-22	0	15	6	8	0	1	27	5	2	0	0	0	0	0	10	7	86
22-23	0	1	3	9	0	4	9	2	0	0	0	0	0	0	5	3	40
23-24	0	1	3	5	0	0	5	0	0	0	0	0	0	0	1	0	21
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	61	840	833	1081	1062	1408	1554	1298	590	281	171	159	111	111	210	223	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 14

		ATCHAFALAYA BAY																	
		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																	
		3847 20 MIN OBSERVATION PAIRS																	
		SUMMER SEASON (JUN TO AUG)																	
WIND SPEED (KNOTS)		DIRECTION BAND																TOTAL	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0-1	0	0	2	2	15	12	18	12	7	23	25	25	25	31	5	7	2	220	
1-2	0	0	5	5	10	36	10	18	25	44	20	15	23	23	12	2	2	257	
2-3	0	0	10	20	31	41	59	38	64	46	20	25	33	51	46	23	2	519	
3-4	0	0	5	41	54	64	54	62	85	70	70	36	72	88	57	51	23	839	
4-5	0	0	25	46	67	85	75	96	132	122	83	75	127	85	57	31	54	1167	
5-6	0	0	41	31	88	101	85	85	181	168	83	127	114	77	67	38	41	1336	
6-7	0	0	44	28	70	70	80	46	132	168	88	124	90	106	28	59	20	1161	
7-8	5	5	38	38	49	33	59	116	111	181	72	67	145	132	49	15	41	1161	
8-9	5	5	36	33	67	33	62	96	119	193	70	59	114	132	44	18	18	1005	
9-10	0	0	5	20	62	25	59	36	59	103	72	57	67	51	38	10	18	691	
10-11	0	0	5	20	28	23	41	36	54	62	41	44	46	25	28	10	5	475	
11-12	0	0	23	23	20	36	7	75	62	62	77	18	10	7	7	0	2	436	
12-13	0	0	0	23	25	25	5	23	33	33	44	18	7	5	5	5	2	436	
13-14	0	0	0	0	12	25	5	33	7	33	46	15	2	2	0	0	0	259	
14-15	0	0	0	0	2	2	5	28	2	2	28	15	2	0	2	0	0	184	
15-16	0	0	0	0	2	2	5	18	0	2	31	2	5	2	0	0	0	72	
16-17	0	0	0	0	2	2	0	5	0	0	25	2	0	0	0	2	0	51	
17-18	0	0	0	5	2	2	0	5	0	2	2	0	0	0	0	0	0	15	
18-19	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	18	
19-20	0	0	0	0	2	0	0	0	0	0	0	5	0	0	0	0	0	5	
20-21	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	5	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
23-24	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		10	252	358	621	626	642	831	1083	1226	909	730	891	831	465	280	236		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 15

ATCHAFALAYA BAY

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WIND SPEED (KNOTS)	FALL SEASON (SEP TO NOV)										6371 20 MIN OBSERVATION PAIRS										TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
0-1	1	3	12	14	9	10	17	9	10	14	14	10	10	14	1	4	160				
1-2	1	0	12	10	10	10	14	17	26	18	14	21	18	15	25	1	219				
2-3	0	17	23	39	37	31	34	39	18	15	12	23	32	15	25	12	386				
3-4	1	26	56	58	43	39	40	48	31	25	21	37	42	32	28	14	549				
4-5	1	6	47	76	53	73	50	59	43	20	9	40	37	29	45	17	687				
5-6	0	84	59	48	64	87	78	105	58	42	21	17	18	23	39	31	781				
6-7	0	3	97	75	54	97	106	141	43	18	17	18	25	36	32	50	864				
7-8	3	105	80	92	128	109	130	141	80	31	20	9	23	37	32	28	1054				
8-9	4	62	61	98	134	89	120	123	51	15	9	15	18	32	14	32	888				
9-10	3	62	58	134	139	100	103	73	47	12	14	17	17	15	21	20	842				
10-11	0	67	81	106	176	73	105	58	12	6	7	6	3	17	15	18	656				
11-12	1	67	86	98	65	69	59	36	28	6	6	3	17	15	29	10	610				
12-13	6	61	69	81	50	34	48	43	28	4	6	4	7	14	36	26	522				
13-14	6	53	31	87	61	28	43	18	26	4	6	4	14	14	54	62	510				
14-15	0	64	37	76	39	4	26	10	17	9	0	3	7	9	37	47	392				
15-16	1	39	54	54	39	4	10	6	9	10	6	1	1	21	20	45	328				
16-17	0	12	29	34	17	1	6	4	9	1	1	0	1	4	9	20	155				
17-18	0	15	14	12	3	0	9	9	3	0	0	0	0	4	7	17	98				
18-19	0	1	6	7	4	0	1	4	0	3	1	0	0	4	12	32	84				
19-20	1	9	1	9	1	1	1	4	3	1	0	0	1	6	18	25	87				
20-21	0	10	1	1	0	0	3	1	1	1	0	0	0	3	3	17	45				
21-22	0	6	0	0	0	0	1	1	1	0	0	0	0	0	0	0	21				
22-23	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	10	26				
23-24	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	25	14				
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
27-28	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
TOTAL	42	916	932	1180	1101	867	1015	918	554	265	189	238	307	365	524	579					

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 16

CONTINENTAL HIGH BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																			
WINTER SEASON (DEC TO FEB)				3548 20 MIN OBSERVATION PAIRS															
WIND SPEED (KNOTS)		DIRECTION BAND																TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0-1	2	14	14	16	14	14	8	5	5	0	2	0	2	11	2	121	67	2	
1-2	0	0	2	16	2	5	5	2	8	8	2	5	2	2	2	11	2	2	
2-3	0	14	25	8	2	2	5	0	5	0	8	8	11	25	5	135	67	5	
3-4	5	50	36	22	11	0	14	5	14	2	5	22	11	31	22	259	31	22	
4-5	5	84	81	39	16	2	8	2	2	0	11	31	36	73	39	442	31	39	
5-6	8	84	152	56	25	14	2	5	2	2	5	25	56	87	73	605	45	73	
6-7	16	109	157	56	22	5	2	2	2	8	11	11	45	62	90	611	62	90	
7-8	0	186	256	129	16	2	8	0	2	0	2	2	33	78	78	800	78	78	
8-9	11	186	211	160	19	5	0	2	5	0	2	2	22	84	171	890	84	171	
9-10	5	146	222	149	28	8	2	0	2	2	5	2	22	101	163	862	101	163	
10-11	2	157	160	118	39	2	2	0	11	0	2	8	25	112	84	735	112	84	
11-12	8	143	231	107	39	11	11	2	0	0	2	11	14	62	101	758	62	101	
12-13	2	180	228	115	25	11	2	5	2	5	11	8	16	67	50	715	39	50	
13-14	2	177	160	84	11	2	5	0	2	2	5	5	28	33	73	538	28	73	
14-15	11	118	186	64	5	5	0	0	5	0	2	11	16	39	67	408	16	39	
15-16	8	107	104	33	5	0	0	0	2	0	0	2	14	42	101	357	42	101	
16-17	5	78	84	11	11	0	5	0	2	0	0	0	14	42	101	357	14	42	
17-18	0	39	45	11	8	2	2	0	0	0	0	0	16	64	98	270	16	64	
18-19	2	22	47	5	5	0	0	0	0	5	0	5	45	39	135	135	45	39	
19-20	0	14	11	5	0	0	0	0	5	2	0	2	19	28	45	115	19	28	
20-21	2	19	2	2	0	0	0	0	2	0	8	5	19	28	45	115	5	19	
21-22	8	5	2	2	0	0	0	0	0	0	0	2	19	28	45	95	2	19	
22-23	0	14	5	5	0	0	0	0	0	0	0	0	5	62	25	25	5	62	
23-24	0	2	0	0	0	0	0	0	0	0	0	0	2	0	2	2	2	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		112	1958	2432	1226	312	98	73	62	59	84	42	90	180	479	1158	1629		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 17

CONTINENTAL HIGH																			
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																			
SPRING SEASON (MAR TO MAY)				2085 20 MIN OBSERVATION PAIRS															
WIND SPEED (KNOTS)		DIRECTION BAND																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	
0-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
2-3	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
3-4	0	23	47	0	4	14	4	0	0	4	0	0	0	4	9	14	0	0	143
4-5	0	124	91	23	19	28	0	4	4	0	0	0	0	0	0	0	0	0	345
5-6	9	105	124	100	52	81	9	0	0	0	0	19	9	9	62	28	28	19	570
6-7	9	167	139	182	100	57	28	4	0	0	0	4	4	0	52	62	19	743	
7-8	9	115	119	278	182	115	19	0	0	0	0	14	14	0	23	28	19	709	
8-9	0	220	139	187	115	19	4	4	0	0	0	4	19	9	4	33	28	796	
9-10	14	211	191	254	81	43	9	4	0	0	4	0	0	4	14	33	47	916	
10-11	9	249	163	206	105	67	0	0	0	4	9	0	0	0	9	52	47	925	
11-12	0	148	163	143	38	38	4	0	0	0	4	0	0	0	4	43	38	628	
12-13	9	230	182	38	23	28	4	0	0	0	0	0	0	0	0	4	19	541	
13-14	4	244	211	62	33	14	0	0	0	0	0	9	4	0	4	0	52	642	
14-15	4	182	158	76	14	4	0	0	0	0	4	0	4	4	4	0	52	513	
15-16	0	187	163	38	14	0	0	0	0	0	0	0	4	4	4	19	28	470	
16-17	0	134	76	28	19	0	0	0	0	4	9	0	0	4	0	28	19	326	
17-18	0	158	76	23	33	4	0	0	4	4	0	9	0	4	4	33	33	345	
18-19	0	105	95	33	33	0	0	0	0	0	0	0	4	0	0	4	52	297	
19-20	0	129	62	33	33	0	0	0	0	0	4	0	0	0	0	57	57	345	
20-21	0	62	28	57	0	0	0	0	0	0	0	0	0	0	0	76	38	263	
21-22	0	81	33	43	0	0	0	0	0	0	0	0	0	0	0	57	38	254	
22-23	0	4	14	52	0	0	0	0	0	0	0	0	0	0	0	23	14	110	
23-24	0	4	19	28	0	0	0	0	0	0	0	0	0	0	0	9	4	67	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		71	2906	2306	1894	666	311	33	19	23	43	43	71	43	206	671	685		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 18

CONTINENTAL HIGH

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

SUMMER SEASON (JUN TO AUG)										273 20 MIN OBSERVATION PAIRS										
WIND SPEED (KNOTS)	DIRECTION BAND										TOTAL									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
0-1	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	73			
1-2	0	0	0	183	36	73	0	0	0	0	0	0	0	0	0	0	183			
2-3	0	0	109	293	219	73	0	0	0	0	0	0	0	0	0	0	402			
3-4	0	73	293	219	73	0	0	0	0	0	0	0	0	36	36	0	769			
4-5	0	146	366	439	0	0	0	0	0	0	0	0	0	0	73	36	1062			
5-6	0	146	183	366	183	0	0	0	0	0	0	0	0	0	146	0	1355			
6-7	0	183	183	476	36	0	0	0	0	0	0	183	293	219	109	0	1648			
7-8	0	109	256	146	0	0	0	0	0	0	0	146	256	183	0	0	915			
8-9	0	109	183	329	36	0	0	0	0	0	0	183	256	0	36	0	1135			
9-10	0	0	256	219	0	0	0	0	0	0	0	109	73	109	73	0	842			
10-11	0	73	219	73	0	0	0	0	0	0	0	36	36	183	73	0	695			
11-12	0	109	256	36	0	0	0	0	0	0	73	0	0	36	0	0	439			
12-13	0	0	329	0	36	0	0	0	0	0	0	0	0	0	36	0	476			
13-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
15-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
TOTAL	0	952	2637	2490	659	73	0	0	0	0	73	659	1025	769	586	73				

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 19

CONTINENTAL HIGH

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WIND SPEED (KNOTS)	2149 20 MIN OBSERVATION PAIRS																TOTAL
	FALL SEASON (SEP TO NOV)																
	DIRECTION BAND																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
0-1	0	0	18	9	0	4	9	0	4	4	4	4	0	9	4	4	83
1-2	0	0	23	23	13	4	0	18	0	13	9	18	23	9	23	0	181
2-3	0	18	27	51	23	4	0	9	9	4	4	23	32	32	27	9	279
3-4	0	23	74	102	55	4	0	0	4	0	4	37	55	46	18	0	432
4-5	0	83	139	65	46	4	0	0	4	0	4	79	23	51	69	9	581
5-6	0	139	153	69	18	4	0	4	0	0	4	32	13	23	32	32	530
6-7	0	139	119	51	37	13	0	0	0	0	0	23	9	37	51	93	595
7-8	0	186	172	69	27	9	0	0	4	0	0	13	27	60	46	51	670
8-9	13	107	139	74	69	4	4	9	4	4	0	0	23	51	4	46	558
9-10	0	162	158	148	69	0	0	9	0	0	0	0	4	13	27	46	642
10-11	0	144	214	223	37	0	0	0	0	0	0	0	4	13	32	23	693
11-12	0	125	269	172	23	0	0	0	0	0	0	0	0	18	27	46	684
12-13	9	107	218	255	97	0	0	9	0	0	0	4	0	9	32	51	795
13-14	4	125	125	172	116	0	0	0	0	4	0	0	0	0	102	116	763
14-15	0	134	167	246	102	4	0	0	0	0	0	0	4	0	60	69	795
15-16	4	97	162	186	116	13	0	0	0	4	0	0	4	0	37	65	693
16-17	0	32	102	107	32	0	0	0	0	0	0	0	0	0	13	41	330
17-18	0	37	51	46	13	0	0	0	0	0	0	0	0	0	13	18	181
18-19	0	4	18	32	13	0	0	0	0	0	0	0	0	0	18	69	158
19-20	0	18	4	32	4	0	0	0	0	0	0	0	0	0	23	60	144
20-21	0	27	0	4	4	0	0	0	0	0	0	0	0	0	0	46	83
21-22	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	27	46
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	60
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	32	1740	2382	2145	926	74	23	51	32	41	32	237	228	376	670	1005	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 20

FRONTAL OVERRUNNING																			
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																			
WINTER SEASON (DEC TO FEB)				2568 20 MIN OBSERVATION PAIRS															
WIND SPEED (KNOTS)		DIRECTION BAND																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	
0-1	0	7	11	11	11	3	0	19	19	19	19	11	23	11	7	3	0	163	
1-2	3	0	0	0	3	11	11	11	3	3	11	15	0	23	7	3	3	105	
2-3	0	7	23	27	19	11	15	11	19	3	7	19	3	15	31	11	11	221	
3-4	0	50	35	19	54	15	23	7	31	31	35	27	15	19	19	15	15	338	
4-5	27	62	66	46	73	23	42	38	27	54	42	54	31	35	23	54	46	525	
5-6	27	109	66	73	23	23	42	42	27	54	42	42	31	35	27	70	81	708	
6-7	23	85	109	54	31	42	42	27	35	35	38	35	38	38	27	77	120	735	
7-8	38	120	54	35	11	0	27	35	62	38	38	15	15	35	27	46	89	611	
8-9	11	97	46	19	7	15	27	35	50	42	0	0	11	42	50	70	93	599	
9-10	15	97	50	19	15	11	7	19	23	38	31	31	19	19	46	11	120	549	
10-11	11	101	35	19	15	7	11	23	15	38	35	35	15	31	31	31	101	556	
11-12	15	101	58	19	17	19	15	31	11	11	11	23	23	38	50	50	120	646	
12-13	3	112	97	27	15	15	15	3	3	19	11	11	27	27	58	62	132	669	
13-14	3	101	77	19	31	38	23	3	3	15	27	23	23	23	50	105	619		
14-15	19	147	70	15	19	11	11	54	7	19	15	15	11	27	7	54	144	626	
15-16	15	167	66	19	3	11	19	27	19	7	7	42	15	15	23	54	101	463	
16-17	3	120	19	3	15	15	3	11	11	0	15	7	15	27	19	38	62	381	
17-18	3	147	23	0	0	0	15	3	19	3	0	15	27	19	7	23	46	272	
18-19	0	70	0	0	0	0	0	0	0	0	0	0	3	3	7	15	19	136	
19-20	3	27	0	0	0	0	0	0	0	0	0	0	0	11	27	15	35	116	
20-21	3	11	0	0	0	0	0	0	0	0	0	0	0	3	27	3	27	85	
21-22	0	0	3	0	0	0	0	0	0	0	0	0	0	0	19	3	42	77	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		218	1838	919	432	354	284	354	358	412	463	451	389	552	603	802	1565		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 21

FRONTAL OVERRUNNING																	
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																	
1237 20 MIN OBSERVATION PAIRS																	
SPRING SEASON (MAR TO MAY)																	
WIND SPEED (KNOTS)	DIRECTION BAND																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0-1	8	16	8	8	40	48	24	0	16	32	8	8	24	16	24	8	291
1-2	8	16	8	56	24	8	48	16	0	24	16	0	0	16	8	8	250
2-3	0	24	16	80	32	8	32	24	0	8	16	16	24	16	16	16	331
3-4	8	113	56	88	105	40	40	56	32	16	32	24	32	24	40	32	743
4-5	0	121	80	64	88	8	32	16	48	24	32	24	40	64	48	72	767
5-6	40	80	105	72	137	72	24	40	8	8	16	32	80	48	48	97	913
6-7	64	97	72	105	88	48	48	48	48	16	32	40	32	8	97	88	937
7-8	48	129	88	80	80	40	40	40	64	48	24	40	40	32	56	129	986
8-9	56	121	64	80	40	32	8	24	16	0	24	8	32	32	16	16	573
9-10	24	64	97	88	88	48	8	0	0	8	0	16	32	8	24	32	541
10-11	56	88	80	16	40	64	0	24	0	8	8	0	16	16	0	32	452
11-12	8	137	105	64	64	32	8	8	0	8	8	24	0	24	32	48	573
12-13	0	113	121	24	48	32	8	24	8	0	0	8	0	24	40	32	693
13-14	16	64	64	56	16	0	24	8	8	0	0	0	8	48	40	40	396
14-15	16	64	80	64	8	8	0	16	0	24	0	0	0	32	88	8	412
15-16	16	105	72	24	0	0	16	16	8	0	8	0	0	32	56	48	404
16-17	8	121	113	16	8	8	8	0	8	0	8	0	0	24	0	8	323
17-18	0	72	64	0	0	0	0	16	8	0	8	0	8	0	0	0	202
18-19	0	40	32	8	0	8	0	0	8	0	0	0	0	0	0	0	97
19-20	8	40	0	0	0	0	16	0	8	0	0	0	0	0	0	16	88
20-21	0	40	8	8	0	0	8	8	0	8	0	0	0	0	0	0	80
21-22	0	8	8	8	0	0	8	16	8	0	0	0	0	0	0	8	56
22-23	0	8	8	0	0	0	0	0	8	0	0	0	8	0	8	8	40
23-24	0	8	0	0	0	0	0	0	0	0	8	0	8	0	0	0	24
24-25	0	0	0	0	0	0	0	0	0	8	0	0	0	8	0	0	16
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	388	1697	1341	1018	913	509	404	396	323	242	242	242	379	476	646	776	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 22

		FRONTAL OVERRUNNING																404 20 MIN OBSERVATION PAIRS															
		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																															
		SUMMER SEASON (JUN TO AUG)																															
WIND SPEED (KNOTS)		DIRECTION BAND																															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																
0-1	0	24	0	24	0	49	24	49	24	74	74	49	74	74	49	24	0	618															
1-2	0	24	24	24	49	49	0	24	0	74	24	24	24	74	0	0	24	420															
2-3	0	49	74	74	49	49	74	74	148	0	24	24	24	74	74	0	24	420															
3-4	0	0	99	99	123	74	0	99	99	24	49	99	24	24	24	123	0	866															
4-5	0	74	74	74	49	173	99	49	74	74	24	0	24	24	24	24	123	1014															
5-6	0	99	99	99	74	74	74	74	49	24	49	0	198	49	49	49	0	866															
6-7	24	123	99	74	24	24	123	74	123	49	49	74	49	123	99	24	24	965															
7-8	0	74	99	24	24	24	24	49	74	0	49	49	74	49	74	24	74	816															
8-9	0	24	24	24	49	0	0	49	49	24	24	49	148	123	74	24	0	742															
9-10	0	0	0	0	0	0	0	49	49	49	49	24	49	49	74	49	49	544															
10-11	0	148	49	0	49	24	24	49	0	49	198	24	24	0	0	0	0	618															
11-12	0	0	0	0	49	0	24	0	0	0	49	24	0	0	0	0	0	148															
12-13	0	0	0	0	24	24	0	0	0	24	0	24	0	0	24	0	0	123															
13-14	0	24	0	0	24	0	0	0	0	0	0	24	0	0	0	0	0	123															
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24															
15-16	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	24															
16-17	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	24	0	74															
17-18	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	0	74															
18-19	0	49	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	99															
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
20-21	0	0	0	24	0	24	0	0	0	0	0	0	0	0	0	0	0	49															
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
TOTAL		24	816	742	643	643	569	816	643	618	767	792	569	767	643	470	470																

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 23

		FRONTAL OVERRUNNING																	
		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																	
		1273 20 MIN OBSERVATION PAIRS																	
		FALL SEASON (SEP TO NOV)																	
WIND SPEED (KNOTS)		DIRECTION BAND																TOTAL	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0-1	0	7	0	15	39	23	31	47	23	0	31	62	15	23	23	0	15	361	
1-2	7	0	62	102	94	86	47	70	47	31	54	23	31	15	54	39	31	369	
2-3	0	102	172	125	54	62	39	31	39	31	15	15	47	70	78	70	47	864	
3-4	3	157	172	70	47	94	7	78	62	15	15	15	23	86	62	125	62	974	
4-5	0	235	117	70	54	31	0	39	47	62	31	15	15	23	39	133	86	1107	
5-6	23	267	149	54	70	39	31	0	15	70	39	7	15	23	70	78	78	989	
6-7	15	188	157	62	15	23	15	15	15	39	23	62	23	23	15	47	47	1068	
7-8	0	62	54	0	39	0	23	15	15	7	7	31	47	15	23	47	23	824	
8-9	0	39	23	23	15	15	39	15	0	7	0	39	7	15	15	15	15	597	
9-10	7	125	15	15	15	15	23	15	0	15	0	23	7	7	23	31	7	259	
10-11	15	109	39	7	23	23	15	7	7	15	7	15	7	15	0	62	39	337	
11-12	23	178	7	23	23	23	23	15	15	15	7	7	15	15	0	47	102	369	
12-13	0	109	7	31	0	0	0	23	15	23	7	0	15	7	0	31	62	416	
13-14	7	47	7	47	31	15	15	15	0	7	0	23	7	0	7	23	54	337	
14-15	0	15	0	31	0	0	7	0	0	0	0	0	0	0	0	15	7	298	
15-16	0	23	0	0	0	15	0	0	0	0	0	0	0	0	0	7	7	86	
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	62	
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	54	
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	70	
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	54	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	23	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		164	1893	1146	809	549	518	322	329	455	306	424	361	463	487	934	832		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 24

WIND SPEED (KNOTS)		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																TOTAL	
		COASTAL RETURN																1721 20 MIN OBSERVATION PAIRS	
		WINTER SEASON (DEC TO FEB)																	
		DIRECTION BAND																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0-1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	
1-2	0	0	0	0	0	17	11	11	0	0	0	0	0	0	0	0	0	11	
2-3	0	0	0	0	40	34	46	34	23	0	0	0	0	0	0	0	0	40	
3-4	0	0	0	17	75	110	122	63	40	46	0	0	0	0	0	0	0	180	
4-5	0	0	0	0	168	180	151	162	52	40	5	0	0	0	0	0	0	476	
5-6	0	0	52	29	203	139	273	145	58	11	0	0	0	0	0	0	0	813	
6-7	0	0	52	29	342	499	354	116	69	5	0	0	0	0	0	0	0	912	
7-8	0	0	11	34	342	534	371	156	11	0	0	0	0	0	0	0	0	1417	
8-9	0	0	0	23	325	534	226	139	52	0	0	0	0	0	0	0	0	1464	
9-10	0	0	0	5	0	156	476	133	69	29	0	0	0	0	0	0	0	1301	
10-11	0	0	0	0	0	139	151	92	11	0	0	0	0	0	0	0	0	987	
11-12	0	0	0	0	0	11	98	127	40	11	0	0	0	0	0	0	0	604	
12-13	0	0	0	0	11	29	156	11	17	0	0	0	0	0	0	0	0	395	
13-14	0	0	0	0	11	11	226	69	0	0	0	0	0	0	0	0	0	290	
14-15	0	0	0	0	11	17	139	40	0	0	0	0	0	0	0	0	0	220	
15-16	0	0	0	0	11	11	139	40	0	0	0	0	0	0	0	0	0	319	
16-17	0	0	0	0	5	11	81	40	0	0	0	0	0	0	0	0	0	209	
17-18	0	0	0	0	5	11	34	0	0	0	0	0	0	0	0	0	0	139	
18-19	0	0	0	0	34	29	23	0	0	0	0	0	0	0	0	0	0	52	
19-20	0	0	0	0	23	11	23	0	0	0	0	0	0	0	0	0	0	87	
20-21	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	58	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		0	69	302	2289	3759	2155	976	337	104	5	0	0	0	0	0	0	0	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 25

COASTAL RETURN

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

2582 20 MIN OBSERVATION PAIRS																	
SPRING SEASON (MAR TO MAY)																	
WIND SPEED (KNOTS)	DIRECTION BAND																TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
0-1	7	3	19	11	11	50	11	27	23	15	27	7	11	3	11	3	247
1-2	0	7	30	15	19	23	19	15	11	34	19	15	7	7	3	0	232
2-3	0	7	42	50	19	30	42	42	27	46	23	15	15	11	3	0	379
3-4	0	0	65	116	81	30	73	104	46	69	19	7	7	3	0	0	627
4-5	0	46	61	192	158	73	104	96	89	46	3	23	23	7	0	0	828
5-6	0	77	81	170	193	73	154	96	85	131	34	0	11	7	0	3	890
6-7	0	61	104	305	243	154	96	85	131	34	0	0	0	0	0	0	1231
7-8	3	23	112	321	255	271	92	65	19	0	0	0	0	0	0	0	1165
8-9	0	3	69	220	344	321	92	19	11	0	0	0	0	0	0	0	1084
9-10	0	0	65	193	240	213	108	7	0	0	0	0	0	0	0	0	828
10-11	0	0	54	123	220	151	85	0	0	0	0	0	0	0	0	0	642
11-12	0	0	3	46	81	158	100	7	0	0	0	0	0	0	0	0	549
12-13	0	0	3	7	73	158	108	11	0	0	3	0	0	0	0	0	449
13-14	0	0	3	65	34	127	92	0	0	0	0	0	0	0	0	0	325
14-15	0	0	3	46	11	73	23	0	0	3	0	0	0	0	0	0	162
15-16	0	0	3	81	11	54	23	0	0	0	7	0	0	0	0	3	185
16-17	0	0	0	15	0	30	34	0	0	0	3	0	0	0	0	0	85
17-18	0	0	0	0	0	7	15	0	0	0	0	0	0	0	0	0	23
18-19	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	19
19-20	0	0	0	0	0	3	27	0	0	0	0	0	0	0	0	0	30
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-22	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	19	251	770	1994	2072	2017	1243	546	441	309	108	69	81	42	19	11	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

COASTAL RETURN

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).
THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 27

COASTAL RETURN

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

1444 20 MIN OBSERVATION PAIRS																	
WIND SPEED (KNOTS)	FALL SEASON (SEP TO NOV)										DIRECTION BAND						TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
0-1	0	0	0	6	13	6	13	20	13	13	0	13	6	6	0	117	
1-2	0	0	6	6	13	13	34	41	27	0	0	0	0	0	0	131	
2-3	0	0	0	27	34	27	62	27	20	0	0	0	0	0	0	207	
3-4	0	0	6	34	62	62	76	69	20	13	0	0	0	0	0	346	
4-5	0	0	13	110	221	193	124	103	27	6	0	0	0	0	0	803	
5-6	0	0	6	90	221	283	159	124	34	0	0	0	0	0	0	921	
6-7	0	0	6	145	346	290	186	117	13	0	0	0	0	0	0	1108	
7-8	0	0	13	180	533	373	166	110	6	0	0	0	0	0	0	1385	
8-9	0	0	13	263	491	353	221	69	0	0	0	0	0	0	0	1412	
9-10	0	0	20	373	498	367	76	0	0	0	0	0	0	0	0	1336	
10-11	0	0	0	166	290	221	62	0	0	6	0	0	0	0	0	747	
11-12	0	0	0	207	242	159	48	6	6	0	0	0	0	0	0	671	
12-13	0	0	0	90	124	48	13	13	0	0	0	0	0	0	0	290	
13-14	0	0	0	117	131	62	0	6	0	0	0	0	0	0	0	318	
14-15	0	0	0	34	62	0	6	0	0	0	0	0	0	0	0	103	
15-16	0	0	0	6	41	0	0	0	0	0	0	0	0	0	0	48	
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	0	0	96	1855	3372	2465	1253	713	173	41	0	13	6	6	0	0	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

GULF RETURN

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND). BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH. INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 29

GULF RETURN
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

SPRING SEASON (MAR TO MAY)										4753 20 MIN OBSERVATION PAIRS									
WIND SPEED (KNOTS)	DIRECTION BAND										TOTAL								
	1	2	3	4	5	6	7	8	9	10									
0-1	0	0	0	6	21	21	31	6	14	8	122								
1-2	0	0	2	10	21	23	25	6	18	6	128								
2-3	0	0	2	18	35	37	56	27	54	21	239								
3-4	0	16	14	27	42	75	107	94	73	25	488								
4-5	0	4	25	63	113	172	189	189	132	31	917								
5-6	0	0	4	71	179	220	262	340	174	37	1232								
6-7	0	0	10	23	75	237	300	448	225	46	1411								
7-8	0	0	0	4	56	212	296	481	225	52	1397								
8-9	0	0	0	0	33	183	321	342	107	42	1087								
9-10	0	0	0	0	35	183	195	214	86	35	782								
10-11	0	0	0	0	42	84	151	151	29	8	483								
11-12	0	0	0	0	44	96	132	98	18	2	408								
12-13	0	0	0	0	6	73	130	58	18	6	296								
13-14	0	0	0	0	6	56	111	31	4	0	210								
14-15	0	0	0	0	2	44	105	25	0	2	178								
15-16	0	0	0	0	0	25	73	25	0	0	126								
16-17	0	0	0	0	0	23	69	10	0	0	105								
17-18	0	0	0	0	0	14	50	2	2	0	69								
18-19	0	0	0	0	0	8	33	2	0	0	44								
19-20	0	0	0	0	0	14	48	6	0	0	69								
20-21	0	0	0	0	0	14	54	0	4	0	69								
21-22	0	0	0	0	0	12	63	8	4	0	77								
22-23	0	0	0	0	0	10	23	4	0	0	37								
23-24	0	0	0	0	0	2	12	0	0	0	14								
24-25	0	0	0	0	0	0	0	0	0	0	0								
25-26	0	0	0	0	0	0	0	0	0	0	0								
26-27	0	0	0	0	0	0	0	0	0	0	0								
27-28	0	0	0	0	0	0	0	0	0	0	0								
28-29	0	0	0	0	0	0	0	0	0	0	0								
29-30	0	0	0	0	0	0	0	0	0	0	0								
30-31	0	0	0	0	0	0	0	0	0	0	0								
31-32	0	0	0	0	0	0	0	0	0	0	0								
32-33	0	0	0	0	0	0	0	0	0	0	0								
33-34	0	0	0	0	0	0	0	0	0	0	0								
34-35	0	0	0	0	0	0	0	0	0	0	0								
35-36	0	0	0	0	0	0	0	0	0	0	0								
36-37	0	0	0	0	0	0	0	0	0	0	0								
37-38	0	0	0	0	0	0	0	0	0	0	0								
38-39	0	0	0	0	0	0	0	0	0	0	0								
39-40	0	0	0	0	0	0	0	0	0	0	0								
TOTAL	0	21	58	225	645	1838	2848	2577	974	330	212	166	71	21	2	6			

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 30

GULF RETURN																			
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																			
SUMMER SEASON (JUN TO AUG)		1520 20 MIN OBSERVATION PAIRS																	
WIND SPEED (KNOTS)		DIRECTION BAND																TOTAL	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0-1	0	0	0	0	0	0	0	0	13	6	13	6	32	0	0	0	0	78	
1-2	0	0	0	0	6	6	0	6	52	46	19	0	13	6	19	0	0	184	
2-3	0	0	0	0	19	39	39	59	59	59	26	19	13	6	0	6	0	328	
3-4	0	0	0	0	0	39	59	85	151	105	59	26	46	32	6	0	0	618	
4-5	0	0	0	0	0	32	85	125	276	210	72	59	19	6	19	0	0	907	
5-6	0	0	0	0	13	26	92	78	368	348	138	164	39	13	6	6	0	1296	
6-7	0	0	0	0	6	19	52	46	289	342	138	243	59	46	6	6	0	1256	
7-8	0	0	0	0	0	6	46	125	184	394	131	125	78	32	0	0	0	1125	
8-9	0	0	0	0	0	13	46	131	217	217	157	125	59	19	0	13	0	1000	
9-10	0	0	0	0	0	0	59	65	131	250	151	72	26	6	0	0	0	763	
10-11	0	0	0	6	6	13	59	65	111	144	92	78	52	6	6	0	0	644	
11-12	0	0	0	0	0	6	13	157	157	144	144	19	6	6	0	0	0	657	
12-13	0	0	0	0	0	0	6	52	85	85	98	26	6	13	0	0	0	375	
13-14	0	0	0	0	0	0	6	85	19	78	118	6	6	0	0	0	0	322	
14-15	0	0	0	0	0	0	0	65	6	6	77	32	0	0	0	0	0	184	
15-16	0	0	0	0	0	0	13	46	0	0	78	6	0	0	0	0	0	144	
16-17	0	0	0	0	0	0	0	13	0	0	59	6	0	0	0	0	0	78	
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18-19	0	0	0	0	6	0	0	0	0	0	0	0	0	0	6	0	0	13	
19-20	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	13	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22-23	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		0	0	6	59	190	572	1223	2111	2447	1565	1046	434	230	72	39	0		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 31

GULF RETURN

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

WIND SPEED (KNOTS)	1135 20 MIN OBSERVATION PAIRS																TOTAL	
	FALL SEASON (SEP TO NOV)																	
	1	2	3	4	5	6	7	DIRECTION BAND			10	11	12	13	14	15	16	
								8	9									
0-1	0	0	0	0	0	0	17	8	0	17	8	0	0	0	0	0	0	52
1-2	0	0	0	0	0	0	35	8	8	8	8	0	0	0	0	0	0	70
2-3	0	0	0	0	17	52	44	88	35	17	8	0	0	0	0	0	0	264
3-4	0	0	0	0	17	61	79	149	88	26	0	0	0	0	0	0	0	422
4-5	0	0	0	0	0	52	114	132	158	26	0	0	0	0	0	0	0	484
5-6	0	0	0	0	0	88	229	378	273	61	17	0	0	0	0	0	0	1048
6-7	0	0	0	0	17	114	325	387	176	44	35	8	0	0	0	0	0	1110
7-8	0	0	0	0	0	79	502	651	422	132	26	0	0	0	0	0	0	1814
8-9	0	0	0	0	0	35	440	616	308	17	26	0	0	0	0	0	0	1627
9-10	0	0	0	0	0	52	414	378	193	26	0	0	0	0	0	0	0	1092
10-11	0	0	0	0	0	70	387	264	8	17	0	0	0	0	0	0	0	731
11-12	0	0	0	0	0	132	123	105	17	0	0	0	0	0	0	0	0	449
12-13	0	0	0	0	0	17	158	96	88	17	0	8	0	0	0	0	0	387
13-14	0	0	0	0	0	0	185	35	70	17	0	0	8	0	8	0	0	325
14-15	0	0	0	0	0	0	44	0	52	26	0	0	0	0	0	8	0	132
15-16	0	0	0	0	0	0	17	8	8	44	8	0	0	0	0	0	0	88
16-17	0	0	0	0	0	0	0	0	44	8	0	0	0	0	0	8	0	79
17-18	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	8
18-19	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	8
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	52	678	3145	3330	2052	537	140	26	8	8	8	17	0	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 32

FRONTAL GULF RETURN																		
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																		
1148 20 MIN OBSERVATION PAIRS																		
WINTER SEASON (DEC TO FEB)																		
WIND SPEED (KNOTS)		DIRECTION BAND																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0-1	0	0	0	0	17	34	60	34	60	52	34	8	8	34	8	0	8	374
1-2	0	0	0	0	8	17	17	8	17	17	26	8	17	17	8	0	0	182
2-3	0	0	8	0	26	17	17	52	43	26	17	8	17	26	26	8	0	296
3-4	0	8	34	0	26	34	8	78	26	17	43	60	43	17	26	0	0	435
4-5	0	0	60	52	113	52	43	54	104	148	87	104	87	78	34	52	0	1054
5-6	0	0	17	52	165	60	34	87	78	34	87	113	60	69	34	17	8	923
6-7	0	0	43	34	87	139	78	104	34	26	34	17	8	26	52	17	8	705
7-8	0	0	0	43	60	60	52	95	95	8	8	8	8	52	26	17	34	557
8-9	0	0	0	34	113	78	130	26	87	43	8	8	8	52	0	17	8	618
9-10	0	0	0	17	78	69	243	121	148	52	0	0	0	52	52	0	0	833
10-11	0	0	0	0	43	87	174	165	226	60	34	0	0	17	43	0	0	855
11-12	0	0	0	0	8	60	139	156	174	52	8	0	8	0	8	0	0	613
12-13	0	0	0	0	8	113	165	148	130	52	0	0	0	0	17	0	0	633
13-14	0	0	0	0	34	130	226	165	60	60	8	0	0	0	0	0	0	686
14-15	0	0	0	0	8	165	104	182	43	52	26	0	0	0	0	0	0	585
15-16	0	0	0	0	8	87	60	78	8	8	0	0	0	0	0	0	0	244
16-17	0	0	0	0	0	60	69	52	8	8	0	0	0	0	0	0	0	200
17-18	0	0	0	0	0	8	17	8	8	8	0	0	0	0	0	0	0	44
18-19	0	0	0	0	0	17	26	8	8	0	0	0	0	0	0	0	0	60
19-20	0	0	0	0	0	8	34	0	8	0	0	0	0	0	0	0	0	55
20-21	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	8
21-22	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	17
22-23	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	8
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		8	139	278	801	1306	1733	1611	1393	731	418	331	261	444	339	130	69	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 33

FRONTAL GULF RETURN																		
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																		
495 20 MIN OBSERVATION PAIRS																		
WIND SPEED (KNOTS)		DIRECTION BAND																
SPRING SEASON (MAR TO MAY)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0-1	0	20	0	0	0	20	20	40	40	60	20	0	20	20	0	0	0	262
1-2	0	0	40	0	40	60	40	80	60	0	0	0	20	0	0	0	0	383
2-3	0	0	0	141	101	121	121	60	40	101	101	0	20	20	0	20	20	787
3-4	20	60	181	242	242	222	121	101	101	101	121	0	0	0	0	0	40	1454
4-5	0	222	363	262	424	242	161	121	141	20	60	0	0	0	0	20	40	1838
5-6	0	0	40	181	181	424	242	60	121	60	20	0	20	0	0	0	0	1353
6-7	0	121	60	181	202	161	0	161	60	20	0	0	0	0	0	0	0	949
7-8	0	0	60	20	101	222	80	0	80	60	20	0	0	0	0	0	0	646
8-9	0	0	40	60	141	141	121	0	80	40	0	0	0	0	0	0	0	626
9-10	0	0	20	40	141	121	101	0	40	0	0	20	0	0	40	20	0	545
10-11	0	0	40	20	80	60	80	20	0	0	0	0	0	0	0	0	40	343
11-12	0	0	0	0	60	20	121	20	20	20	20	20	0	40	0	0	0	363
12-13	0	0	0	0	0	60	40	20	20	0	20	0	0	0	20	0	0	262
13-14	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	80
14-15	0	0	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	60
15-16	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	20
16-17	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		20	686	1010	1636	2161	1515	565	969	525	383	60	101	80	60	80	141	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 34

FRONTAL GULF RETURN																		
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																		
249 20 MIN OBSERVATION PAIRS																		
SUMMER SEASON (JUN TO AUG)																		
WIND SPEED (KNOTS)	1	2	3	4	5	6	DIRECTION BAND				10	11	12	13	14	15	16	TOTAL
							7	8	9									
0-1	0	0	40	0	0	40	0	80	80	160	0	80	40	0	40	40	40	602
1-2	0	0	0	0	80	80	0	0	0	120	40	40	120	40	40	40	0	481
2-3	0	0	0	0	40	40	0	120	281	40	80	120	120	40	40	40	0	923
3-4	0	0	0	0	0	0	0	0	200	240	160	40	80	40	120	120	0	1044
4-5	0	0	0	0	0	40	80	40	40	40	40	120	200	0	80	40	40	843
5-6	0	0	0	40	120	40	40	40	200	200	160	80	40	40	40	40	40	1044
6-7	0	0	0	0	120	80	120	40	120	40	40	120	80	0	0	0	40	722
7-8	0	40	0	0	0	160	0	200	160	40	0	40	80	40	40	40	80	803
8-9	0	0	0	0	40	40	200	120	120	40	0	281	40	0	80	80	1044	
9-10	0	0	0	40	40	80	40	0	40	80	80	120	40	80	0	0	644	
10-11	0	0	0	0	0	80	0	0	0	0	120	80	120	80	0	0	444	
11-12	0	0	0	0	40	0	80	0	0	0	80	80	40	80	0	40	481	
12-13	0	0	0	0	0	0	40	0	0	0	0	40	0	0	40	0	120	
13-14	0	0	40	0	40	0	0	0	0	0	0	80	0	0	0	0	200	
14-15	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	40	
15-16	0	0	40	0	0	0	0	0	0	0	0	40	40	0	0	0	120	
16-17	0	0	0	40	0	0	0	0	0	0	0	40	40	0	0	0	120	
17-18	0	0	80	0	0	0	0	0	0	0	0	0	0	0	40	0	120	
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	80	
24-25	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	0	40	321	160	522	682	602	763	1044	1124	722	1325	1164	562	522	441		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 35

		FRONTAL GULF RETURN																	
		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																	
		240 20 MIN OBSERVATION PAIRS																	
		FALL SEASON (SEP TO NOV)																	
		DIRECTION BAND																	
		WIND SPEED (KNOTS)																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16		
0-1	0	0	0	0	0	83	83	0	41	125	41	41	83	41	41	0	0	583	
1-2	0	0	0	0	0	41	125	0	0	83	41	41	41	41	41	41	0	375	
2-3	0	0	0	0	83	83	125	0	166	41	41	125	41	41	41	41	0	833	
3-4	0	0	0	0	41	83	83	83	0	125	41	166	41	41	0	83	125	875	
4-5	0	0	0	0	0	83	250	83	125	83	125	166	125	0	0	0	41	1083	
5-6	0	0	0	0	41	41	125	208	0	41	41	208	125	41	41	0	41	916	
6-7	0	0	0	41	41	83	208	250	83	0	0	41	41	41	83	0	0	916	
7-8	0	0	0	0	0	166	291	125	0	0	0	0	0	41	0	41	0	1166	
8-9	0	0	0	0	0	333	250	0	0	0	0	0	0	41	41	41	0	958	
9-10	0	0	0	0	0	125	375	83	125	41	0	0	0	0	41	0	0	916	
10-11	0	0	0	0	41	83	83	125	41	0	0	0	0	0	0	0	0	375	
11-12	0	0	0	0	0	0	83	0	41	0	0	0	0	0	0	83	0	208	
12-13	0	0	0	0	0	125	125	83	0	0	0	0	0	0	0	0	0	333	
13-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	125	
14-15	0	0	0	0	0	41	41	0	0	0	0	0	0	41	0	0	0	291	
15-16	0	0	0	0	0	125	41	41	0	0	0	0	0	0	0	0	0	41	
16-17	0	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	0	0	41	1291	1500	2166	1083	500	500	333	791	500	291	333	333	333	333		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 36

WIND SPEED (KNOTS)		BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																504 20 MIN OBSERVATION PAIRS	
		GULF HIGH																	
WINTER SEASON (DEC TO FEB)		DIRECTION BAND																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	
0-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	138	
1-2	0	19	0	0	39	0	0	19	99	19	39	0	19	0	39	0	39	138	
2-3	59	59	0	0	0	0	19	99	99	79	0	39	39	19	0	19	0	277	
3-4	0	39	59	0	19	0	39	79	198	39	0	158	19	99	99	178	99	615	
4-5	79	39	59	59	0	0	0	79	99	59	99	416	138	79	0	119	59	1250	
5-6	19	0	19	19	19	0	0	119	119	119	376	357	198	19	198	59	79	1349	
6-7	158	19	19	0	0	0	0	0	178	257	317	227	198	218	59	138	59	1607	
7-8	0	0	0	0	0	0	0	0	198	19	317	158	317	198	0	138	59	1924	
8-9	0	0	0	0	0	0	0	0	39	0	79	178	317	19	0	178	59	1289	
9-10	0	0	0	0	0	0	0	0	0	0	0	79	178	19	0	158	0	674	
10-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	119	0	416	
11-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198	19	218	
12-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	19	
13-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL		317	178	138	138	39	59	436	1011	615	1349	1567	1309	575	714	1031	515		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 37

GULF HIGH

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

194 20 MIN OBSERVATION PAIRS																	
SPRING SEASON (MAR TO MAY)																	
WIND SPEED (KNOTS)	DIRECTION BAND																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0-1	0	0	0	0	0	0	51	0	154	154	51	0	51	0	0	0	463
1-2	0	0	51	0	51	0	0	0	51	309	51	0	0	0	0	51	567
2-3	0	154	154	0	103	0	51	0	51	360	206	51	0	0	51	0	1237
3-4	0	51	103	0	51	0	0	0	206	154	360	309	154	257	0	154	1855
4-5	0	0	0	51	0	0	51	0	51	309	51	412	360	154	0	103	1546
5-6	0	51	0	103	0	0	0	0	103	51	257	721	0	0	154	0	1443
6-7	0	51	51	0	0	0	0	0	0	51	51	463	51	0	0	0	1721
7-8	0	51	51	0	0	0	0	0	0	51	51	0	51	0	0	0	257
8-9	0	51	154	0	0	0	0	0	0	0	0	0	0	0	0	0	51
9-10	0	103	51	0	0	0	0	0	0	0	0	0	0	0	0	0	206
10-11	0	103	206	0	0	0	0	0	0	0	0	0	0	0	0	0	154
11-12	0	257	154	0	0	0	0	0	0	0	0	0	0	0	0	0	309
12-13	0	103	103	0	0	0	0	0	0	0	0	0	0	0	0	0	412
13-14	0	103	51	0	0	0	0	0	0	0	0	0	0	0	0	0	206
14-15	51	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154
15-16	0	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	206
16-17	0	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	51	1494	1134	154	206	0	154	309	1134	1237	1237	1752	567	0	463	103	

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 38

GULF HIGH																			
BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION (IN PERCENT OCCURRENCE X100)																			
SUMMER SEASON (JUN TO AUG)				876 20 MIN OBSERVATION PAIRS															
WIND SPEED (KNOTS)		DIRECTION BAND																TOTAL	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0-1	0	0	0	57	11	22	22	0	11	22	68	45	34	0	11	0	308		
1-2	0	11	11	11	0	34	22	22	79	11	45	57	45	11	0	0	342		
2-3	0	22	22	34	34	34	79	22	22	22	45	79	148	79	0	0	799		
3-4	0	0	34	57	22	11	0	11	34	91	45	216	296	194	114	57	1187		
4-5	0	34	34	22	11	11	11	22	68	171	216	479	262	182	79	159	1769		
5-6	0	91	34	0	11	11	11	22	68	57	125	365	228	205	79	159	1472		
6-7	0	0	0	0	0	11	0	11	45	114	91	205	205	57	159	68	1061		
7-8	11	68	11	11	11	0	11	0	34	57	57	433	410	159	57	91	1426		
8-9	22	91	0	11	0	0	0	0	0	0	22	228	422	136	11	22	970		
9-10	0	11	0	0	0	0	0	0	0	0	57	114	125	79	11	79	479		
10-11	0	0	0	0	0	0	0	0	0	0	22	57	34	0	0	0	114		
11-12	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	11	45		
12-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
13-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
14-15	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	11		
15-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TOTAL		34	422	148	194	102	102	125	171	365	547	799	2305	2226	1198	605	650		

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 39

GULF HIGH

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

FALL SEASON (SEP TO NOV)										341 20 MIN OBSERVATION PAIRS										
WIND SPEED (KNOTS)	DIRECTION BAND										TOTAL									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
0-1	0	0	58	29	0	0	29	0	58	0	58	29	175	175	0	0	615			
1-2	0	0	29	0	0	0	0	0	117	205	58	117	146	87	175	0	938			
2-3	0	0	0	0	0	0	0	0	0	87	87	234	322	117	58	87	997			
3-4	0	0	0	0	0	0	0	0	29	293	205	381	293	175	146	0	1524			
4-5	0	0	0	0	0	0	0	0	29	175	29	146	293	0	29	0	703			
5-6	0	0	0	0	0	0	0	0	0	351	87	0	117	29	29	87	850			
6-7	0	0	0	0	0	0	0	0	146	58	146	117	146	58	87	87	850			
7-8	0	0	0	0	0	0	0	0	117	117	58	29	87	58	146	29	645			
8-9	0	0	0	0	0	0	0	0	0	87	29	175	146	29	117	0	586			
9-10	0	117	175	29	29	29	0	0	117	87	29	146	58	58	0	0	498			
10-11	0	87	58	29	0	58	0	29	58	58	0	87	0	58	0	0	645			
11-12	0	146	0	0	29	29	29	87	29	29	29	0	0	58	0	29	498			
12-13	0	0	0	0	29	29	58	0	0	0	58	0	0	0	0	58	322			
13-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	87			
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
15-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
19-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
22-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
24-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
29-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
TOTAL	0	351	322	117	87	146	117	117	703	1612	879	1466	1906	909	791	469				

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS(22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES(MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 40

GULF TROPICAL DEPRESSION

BIVARIATE DISTRIBUTION OF WIND SPEED AND DIRECTION
(IN PERCENT OCCURRENCE X100)

267 20 MIN OBSERVATION PAIRS																
FALL SEASON (SEP TO NOV)																
WIND SPEED (KNOTS)	DIRECTION BAND															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-3	0	0	0	0	0	0	0	37	37	0	0	0	0	0	0	0
3-4	0	0	0	0	0	0	0	37	37	0	0	0	0	0	0	0
4-5	0	0	0	0	0	0	0	149	112	0	0	0	0	0	0	74
5-6	0	0	0	0	0	0	0	74	74	37	0	0	0	0	0	262
6-7	0	0	0	0	0	0	0	224	374	112	74	0	0	0	0	149
7-8	0	0	0	0	0	0	74	224	187	37	37	0	0	0	0	636
8-9	0	0	0	0	0	149	112	224	224	37	37	37	0	0	0	749
9-10	0	0	0	0	37	74	262	187	224	0	0	0	0	0	0	861
10-11	0	0	0	0	0	112	337	449	224	74	37	0	0	0	0	1086
11-12	0	0	0	0	0	74	337	374	224	0	37	0	0	0	0	1123
12-13	0	0	0	0	0	112	112	449	224	0	37	37	0	0	0	956
13-14	0	0	0	0	0	0	299	299	74	37	37	0	0	0	0	786
14-15	0	0	0	0	0	0	149	187	112	37	0	0	0	0	0	486
15-16	0	0	0	0	0	0	74	224	74	0	0	0	0	0	0	374
16-17	0	0	0	0	0	0	224	262	37	0	0	0	0	0	0	524
17-18	0	0	0	0	0	0	37	187	37	37	0	37	0	0	0	337
18-19	0	0	0	0	0	0	37	149	37	37	0	0	0	0	0	262
19-20	0	0	0	0	0	0	74	37	74	0	0	0	0	0	0	187
20-21	0	0	0	0	0	0	0	37	37	0	0	0	0	0	0	74
21-22	0	0	0	0	0	0	0	37	37	37	0	0	0	0	0	37
22-23	0	0	0	0	0	0	37	37	0	0	0	0	0	0	0	37
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-25	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0
25-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-30	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32-33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33-34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36-37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38-39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	37	524	2097	3970	2546	411	299	112	0	0	0	0

THE WIND DIRECTION IS DIVIDED INTO 16 BANDS (22.5 DEGREES IN EACH BAND).
BAND 1 IS CENTERED ABOUT 0.0 DEGREES AND INDICATES WINDS BLOWING FROM THE NORTH.
INCREASING BAND NUMBERS REFLECT INCREASING WIND ANGLES (MEASURED CLOCKWISE).

THE WIND SPEED IS THAT MEASURED AT A 10 METER ELEVATION.

Table 41
Maximum Winter Wind Speeds, knots,
at New Orleans and Lake Charles

Year	Direction Band															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<u>New Orleans</u>																
1961	18	16	17	19	16	19	13	18	20	25	17	14	20	22	18	19
1962	23	20	16	18	18	13	16	18	22	25	18	18	20	13	19	20
1963	24	22	20	24	17	12	14	16	19	20	17	11	12	18	17	24
1964	19	17	22	17	18	13	16	20	20	20	25	26	22	16	17	17
1965	21	15	17	15	17	13	23	19	24	15	14	20	23	16	14	18
1966	16	17	19	17	16	18	24	19	22	30	10	16	19	14	23	16
1967	17	15	12	16	13	12	13	14	18	18	17	17	12	13	16	22
1968	19	17	18	15	15	14	16	22	18	18	20	17	20	20	21	19
1969	20	16	16	24	25	24	17	21	17	16	16	18	19	16	20	18
1970	18	14	18	16	15	15	17	16	18	14	14	17	15	14	18	20
1971	17	17	20	19	16	12	17	30	24	19	16	10	16	14	20	16
1972	21	15	16	11	13	14	20	16	16	21	14	5	7	9	18	19
1973	20	17	16	14	15	17	20	29	17	15	14	11	18	27	18	18
1974	18	15	11	14	13	16	21	24	17	22	16	15	20	21	17	16
1975	19	16	14	13	15	17	15	17	20	16	19	15	18	17	16	22
<u>Lake Charles</u>																
1963	28	27	22	23	16	17	18	22	20	22	19	16	15	12	15	18
1964	20	20	21	22	17	16	18	16	19	20	22	18	19	18	18	21
1965	17	17	16	17	16	16	18	18	24	16	14	17	15	14	21	18
1966	22	16	16	16	20	17	22	24	24	13	10	11	8	16	18	20
1967	20	18	18	13	11	14	16	15	16	17	14	12	15	12	14	17
1968	20	20	16	17	14	16	16	18	20	14	13	8	10	15	17	22
1969	18	15	15	15	19	16	15	19	17	17	13	15	15	17	19	19
1970	22	15	16	17	18	20	19	13	19	17	20	26	12	14	17	26
1971	20	17	19	21	19	26	18	20	23	20	18	14	16	19	20	22
1972	20	21	20	22	11	16	18	16	19	17	10	12	10	9	18	18
1973	20	22	17	16	14	21	22	24	25	15	19	20	16	16	21	22
1974	20	16	14	14	20	20	19	26	17	17	16	15	27	30	14	18
1975	24	18	18	16	24	19	28	22	27	15	13	16	16	17	21	22

Table 42
Maximum Spring Wind Speeds, knots,
at New Orleans and Lake Charles

<u>Year</u>	<u>Direction Band</u>															
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>
<u>New Orleans</u>																
1961	20	17	19	18	18	17	15	25	18	17	15	18	19	22	21	17
1962	15	15	17	15	18	15	18	22	18	18	14	20	14	18	19	18
1963	18	18	16	15	15	17	16	18	22	25	18	15	18	16	18	16
1964	16	16	14	14	19	20	18	22	25	25	26	17	19	15	18	16
1965	15	16	15	14	13	15	16	17	18	20	12	14	20	14	16	15
1966	18	14	20	17	20	15	17	20	18	21	15	16	22	15	17	16
1967	16	16	16	15	19	16	24	20	20	16	13	11	22	17	19	17
1968	18	14	14	15	16	18	22	20	23	17	14	19	22	17	17	17
1969	17	17	18	20	18	18	26	29	32	14	17	19	18	15	17	17
1970	14	16	16	15	15	17	20	17	28	15	18	12	15	12	15	17
1971	18	19	12	16	12	14	16	20	24	14	14	17	14	14	16	21
1972	20	18	16	15	15	18	22	16	20	14	17	14	14	11	12	21
1973	16	15	13	12	17	27	27	28	23	18	16	17	18	16	25	17
1974	15	19	15	14	18	19	18	20	22	16	18	15	17	16	20	16
1975	19	15	15	16	19	20	16	18	23	17	16	17	24	15	16	18
<u>Lake Charles</u>																
1963	18	20	18	18	14	14	20	22	24	22	18	15	11	12	24	20
1964	18	20	18	18	19	16	18	20	26	25	24	16	19	20	23	20
1965	18	18	20	13	18	16	17	19	22	15	15	10	10	10	18	18
1966	18	17	18	18	16	15	18	19	20	19	20	15	9	21	21	16
1967	18	25	18	17	15	16	19	23	20	16	11	9	7	7	16	16
1968	18	15	14	15	13	12	18	18	23	16	13	13	15	20	21	14
1969	18	15	18	18	17	26	20	18	28	16	14	17	13	13	20	17
1970	15	17	15	19	12	20	15	21	24	16	13	18	15	14	18	15
1971	22	20	18	17	15	15	18	18	22	17	19	9	16	22	21	23
1972	17	13	23	23	22	15	18	18	20	19	15	10	12	18	16	15
1973	20	20	24	25	22	24	32	28	27	18	18	18	16	17	20	27
1974	17	18	14	19	16	16	23	28	25	18	15	12	15	5	16	20
1975	17	13	15	19	16	26	25	26	26	14	14	12	16	20	17	22

Table 43
Maximum Summer Wind Speeds, knots,
at New Orleans and Lake Charles

<u>Year</u>	<u>Direction Band</u>															
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>
<u>New Orleans</u>																
1961	12	10	13	14	20	12	15	16	13	15	16	18	20	14	10	13
1962	10	16	18	15	13	13	15	15	14	20	19	14	12	13	10	11
1963	16	15	14	14	15	11	11	13	12	15	18	20	12	11	12	10
1964	11	16	11	11	13	12	16	12	12	13	18	20	18	12	11	13
1965	10	9	14	12	14	14	13	15	14	12	23	11	11	14	13	11
1966	12	16	17	15	17	14	13	14	11	16	11	15	11	10	12	9
1967	13	16	13	14	13	16	11	15	20	11	14	12	13	12	10	13
1968	12	12	13	17	20	16	14	16	15	12	13	13	16	11	7	12
1969	24	18	15	13	16	12	14	14	14	14	18	12	24	16	12	30
1970	13	18	12	14	11	14	13	15	17	8	18	14	14	10	14	9
1971	17	10	11	13	8	9	13	23	12	11	10	12	14	10	12	21
1972	17	13	13	15	17	16	15	16	13	15	18	17	14	13	12	10
1973	13	14	13	14	12	21	14	12	15	11	13	13	14	11	13	11
1974	14	18	14	11	13	11	13	17	20	14	9	17	13	12	10	11
1975	11	8	11	9	17	11	13	16	16	14	14	12	13	10	12	10
<u>Lake Charles</u>																
1963	11	13	17	23	18	12	20	19	13	19	17	16	10	12	11	16
1964	13	20	12	15	17	16	18	25	15	16	16	18	12	12	11	11
1965	14	9	11	13	18	28	18	14	16	14	16	14	14	13	13	12
1966	10	10	10	11	12	12	13	13	13	13	15	14	15	7	10	10
1967	13	14	12	14	14	9	12	11	12	14	14	12	11	7	9	7
1968	8	9	13	20	10	8	12	12	15	12	13	11	8	8	5	10
1969	13	15	10	12	15	13	12	15	15	16	13	14	11	11	11	10
1970	11	11	9	10	12	10	14	16	16	14	10	12	11	8	12	8
1971	20	10	14	11	15	15	13	12	16	14	10	12	11	8	12	8
1972	12	12	12	13	16	14	22	14	17	16	17	16	17	11	14	11
1973	12	12	12	12	12	12	15	16	16	15	13	11	12	12	14	12
1974	12	16	16	12	15	13	20	33	22	22	12	18	12	10	16	11
1975	20	18	16	18	12	14	18	22	14	11	9	5	7	12	17	23

Table 44
Maximum Fall Wind Speeds, knots,
at New Orleans and Lake Charles

<u>Year</u>	<u>Direction Band</u>															
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>
<u>New Orleans</u>																
1961	15	18	18	20	16	15	23	22	17	10	9	12	13	11	17	16
1962	15	16	15	15	16	10	12	15	19	14	12	12	15	15	15	17
1963	16	24	20	16	20	17	15	22	14	12	10	14	17	13	17	18
1964	20	14	14	17	17	12	13	17	15	15	10	8	10	13	14	13
1965	15	15	14	14	13	10	6	6	16	17	15	11	12	10	13	13
1966	15	16	13	13	15	15	10	11	12	14	8	9	12	14	22	21
1967	15	14	15	15	15	16	18	16	14	15	17	14	20	14	14	16
1968	23	18	20	17	18	15	14	18	21	15	16	25	19	15	17	17
1969	18	19	15	15	16	13	18	15	14	13	10	8	10	15	17	18
1970	18	15	15	12	17	15	16	17	20	9	12	12	16	13	13	18
1971	16	16	14	15	13	13	12	13	9	16	9	5	8	11	11	13
1972	17	15	15	21	15	17	16	24	24	7	13	13	15	14	15	14
1973	15	17	15	17	17	15	17	18	24	18	14	10	18	14	13	17
1974	16	14	16	15	16	13	15	14	16	8	11	8	11	15	17	14
1975	21	23	15	12	13	15	12	19	17	13	16	6	10	13	17	17
<u>Lake Charles</u>																
1963	18	25	18	23	24	18	17	21	18	20	14	11	8	11	13	20
1964	19	18	20	18	15	12	15	15	20	18	13	10	14	8	15	13
1965	13	14	13	11	12	13	14	13	11	15	15	14	9	5	13	16
1966																
1967	17	16	12	18	16	16	13	15	18	14	14	16	14	16	16	14
1968	16	14	17	17	8	17	20	17	21	14	12	13	18	15	18	18
1969	17	13	15	13	16	15	16	17	17	10	14	13	7	13	11	18
1970	23	22	18	17	20	19	19	21	23	15	16	10	9	12	17	18
1971	19	20	17	16	16	14	14	15	16	18	15	6	9	8	10	16
1972	16	14	14	17	16	18	15	15	18	13	11	8	10	12	14	15
1973	14	17	18	20	25	17	16	18	20	13	13	8	15	16	16	20
1974	18	17	14	14	12	19	16	19	17	10	13	6	14	10	15	18
1975	20	18	16	18	12	14	18	22	14	11	9	5	7	12	16	23

FIGURES

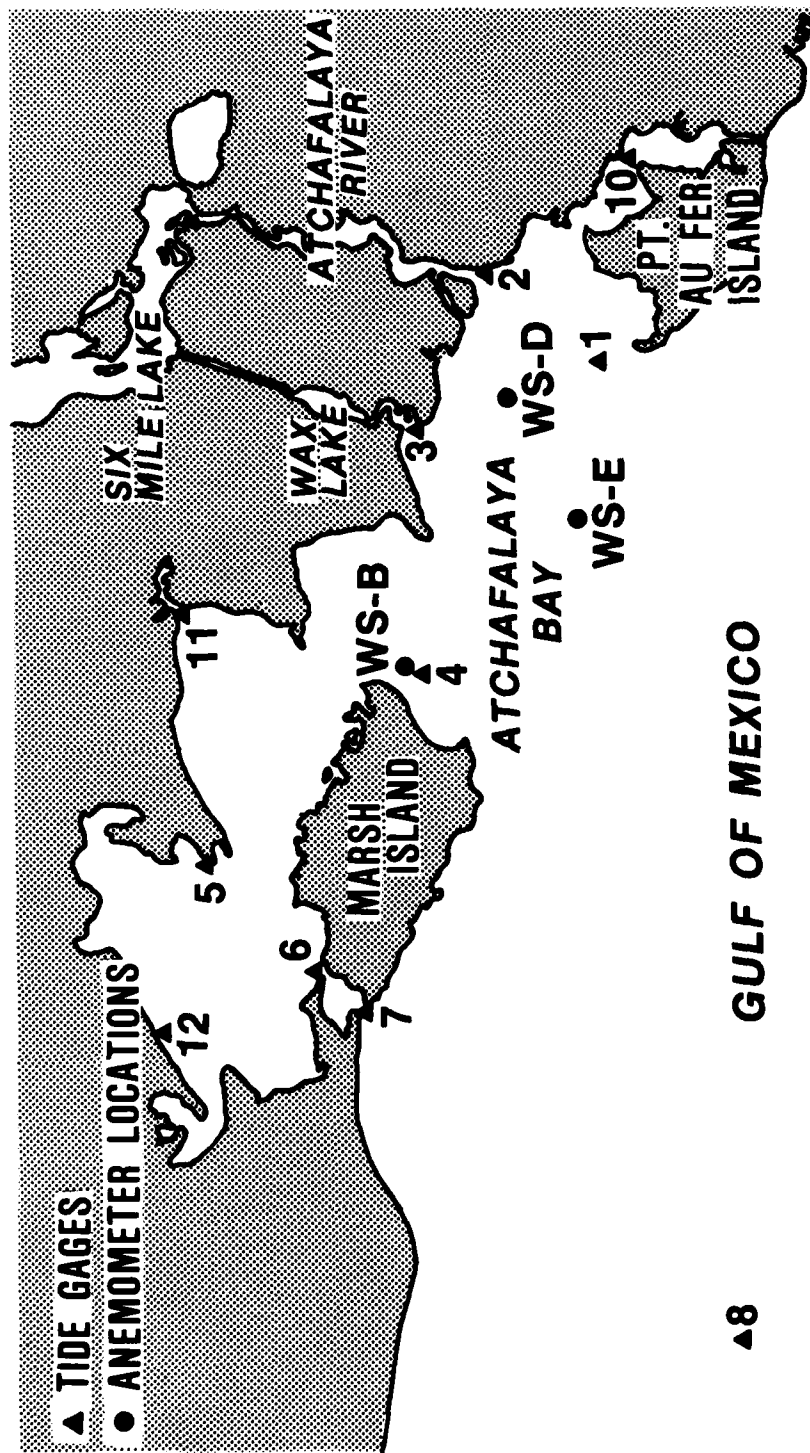


Figure 1. Location of weather stations (WS) in the Atchafalaya Bay

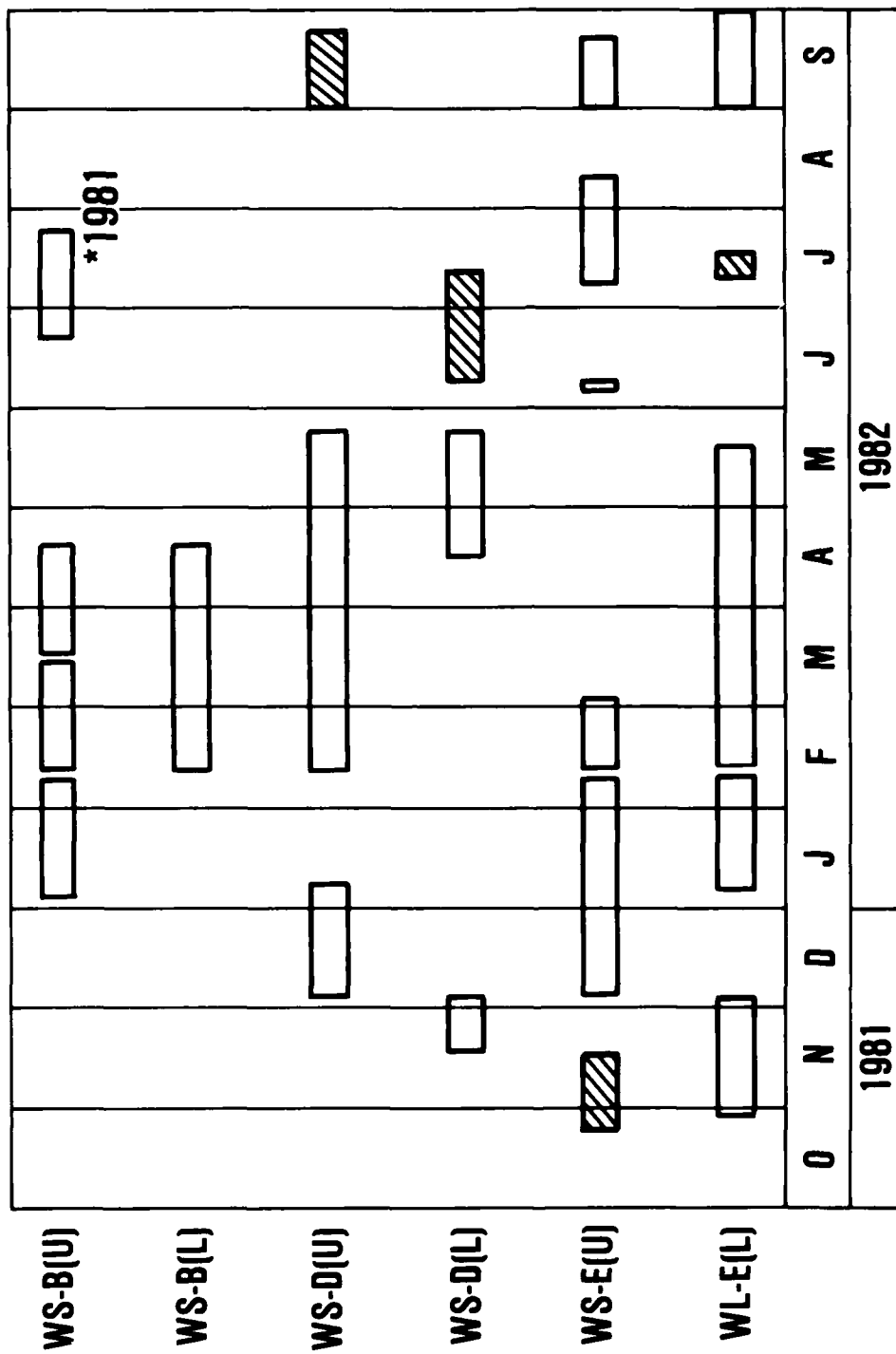


Figure 2. Prototype data collected in the Atchafalaya Bay

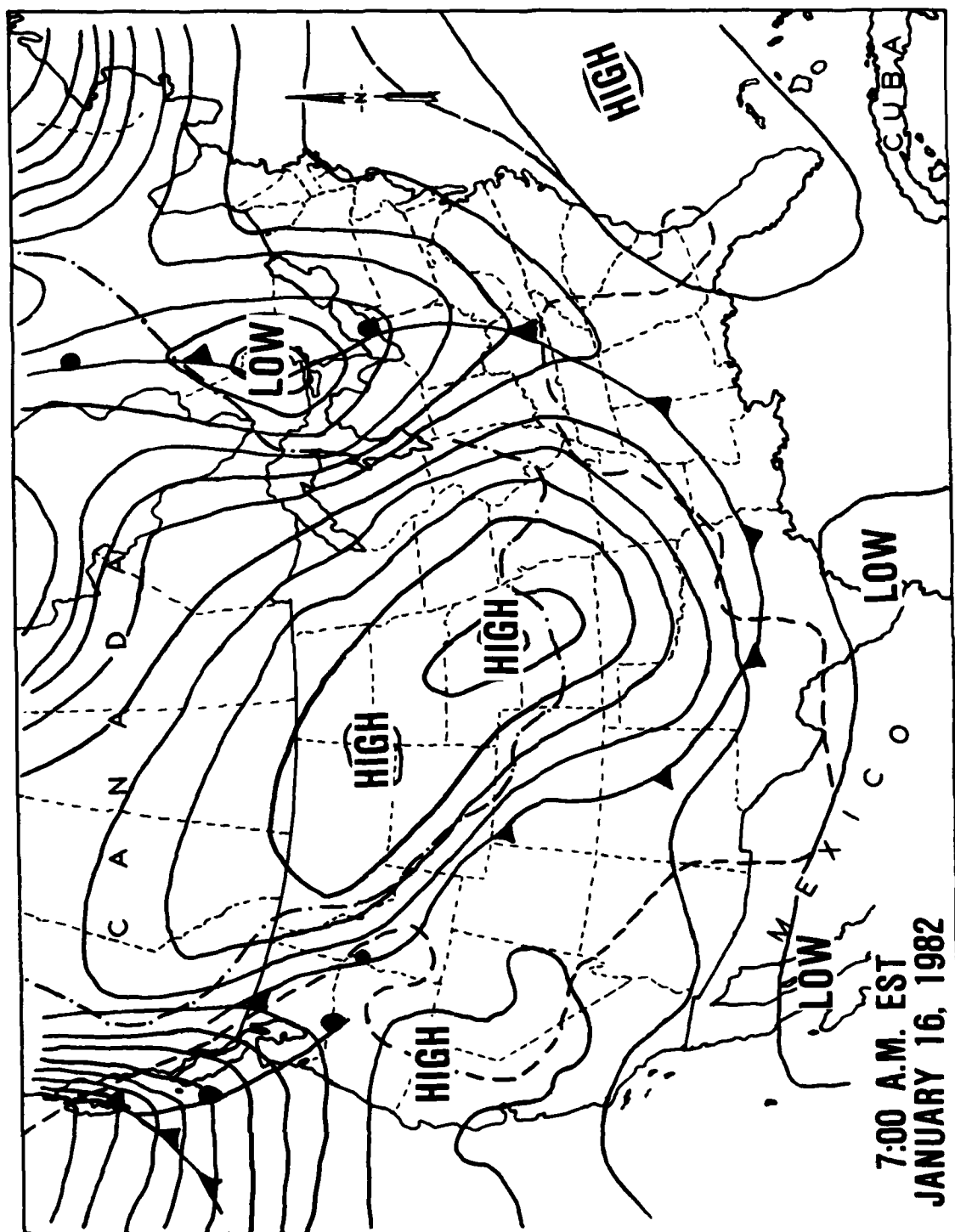


Figure 3. Isobaric contour map of FOR circulation

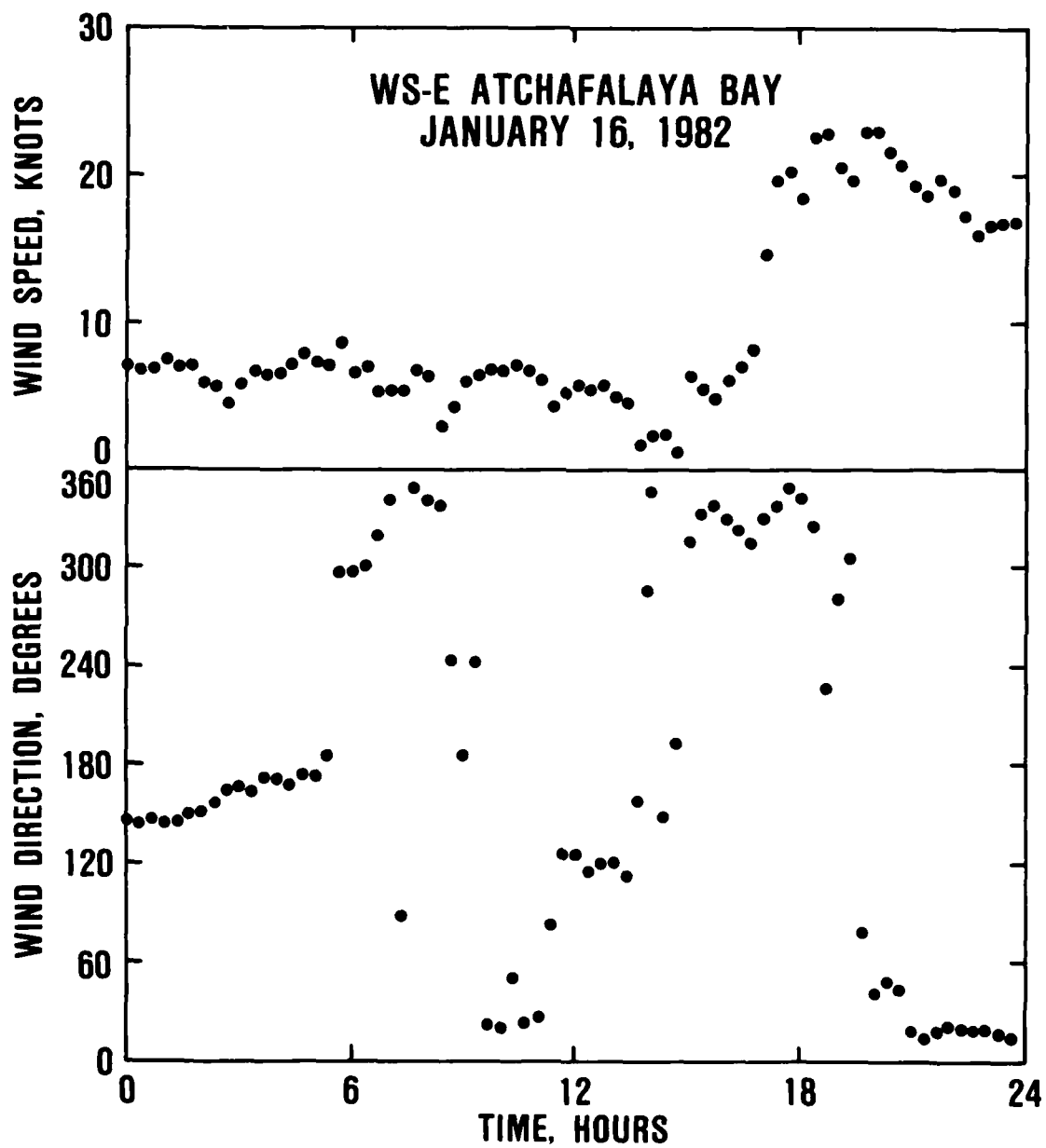


Figure 4. Prototype wind measurements during FOR circulation

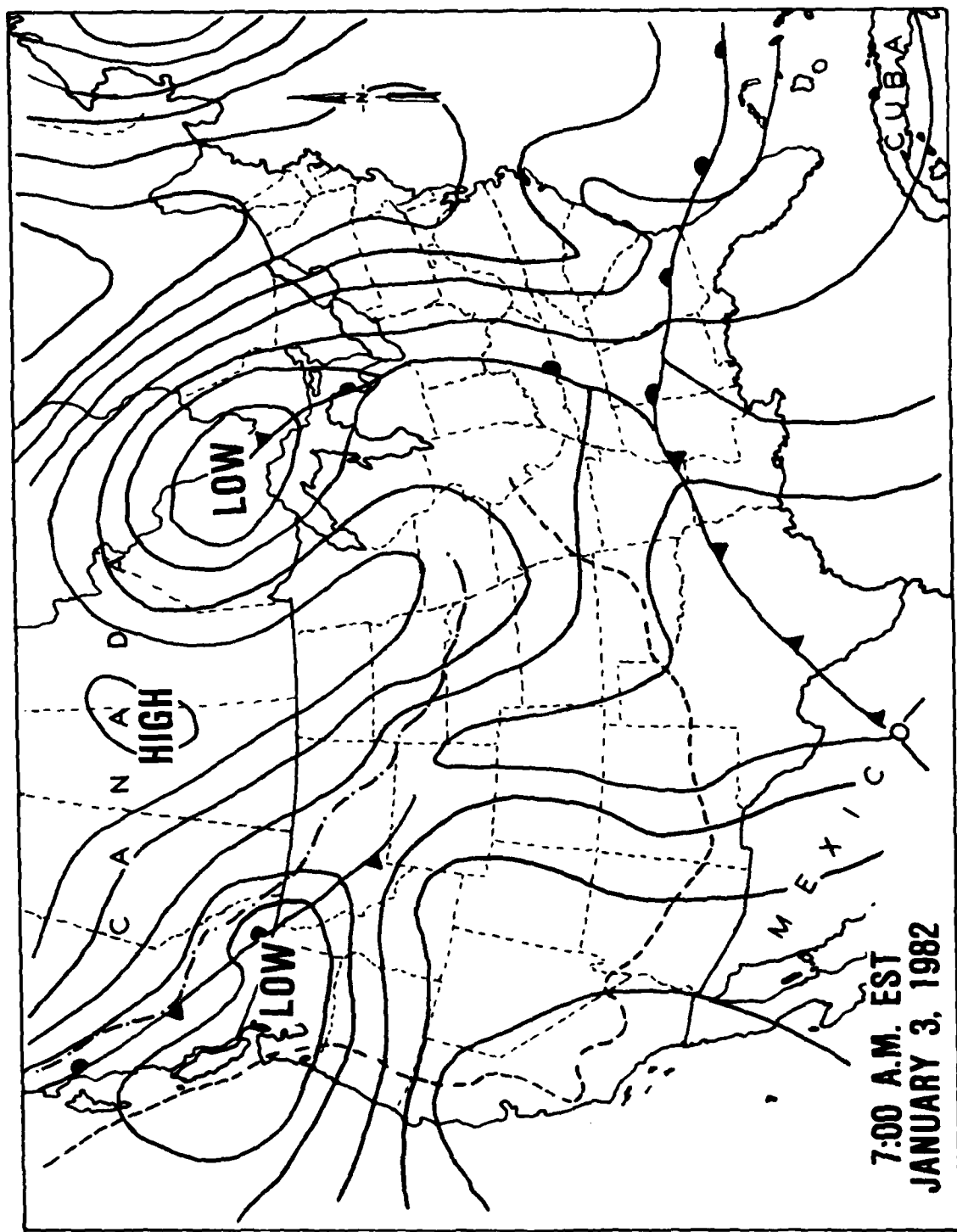


Figure 5. Isobaric contour map of FGR circulation

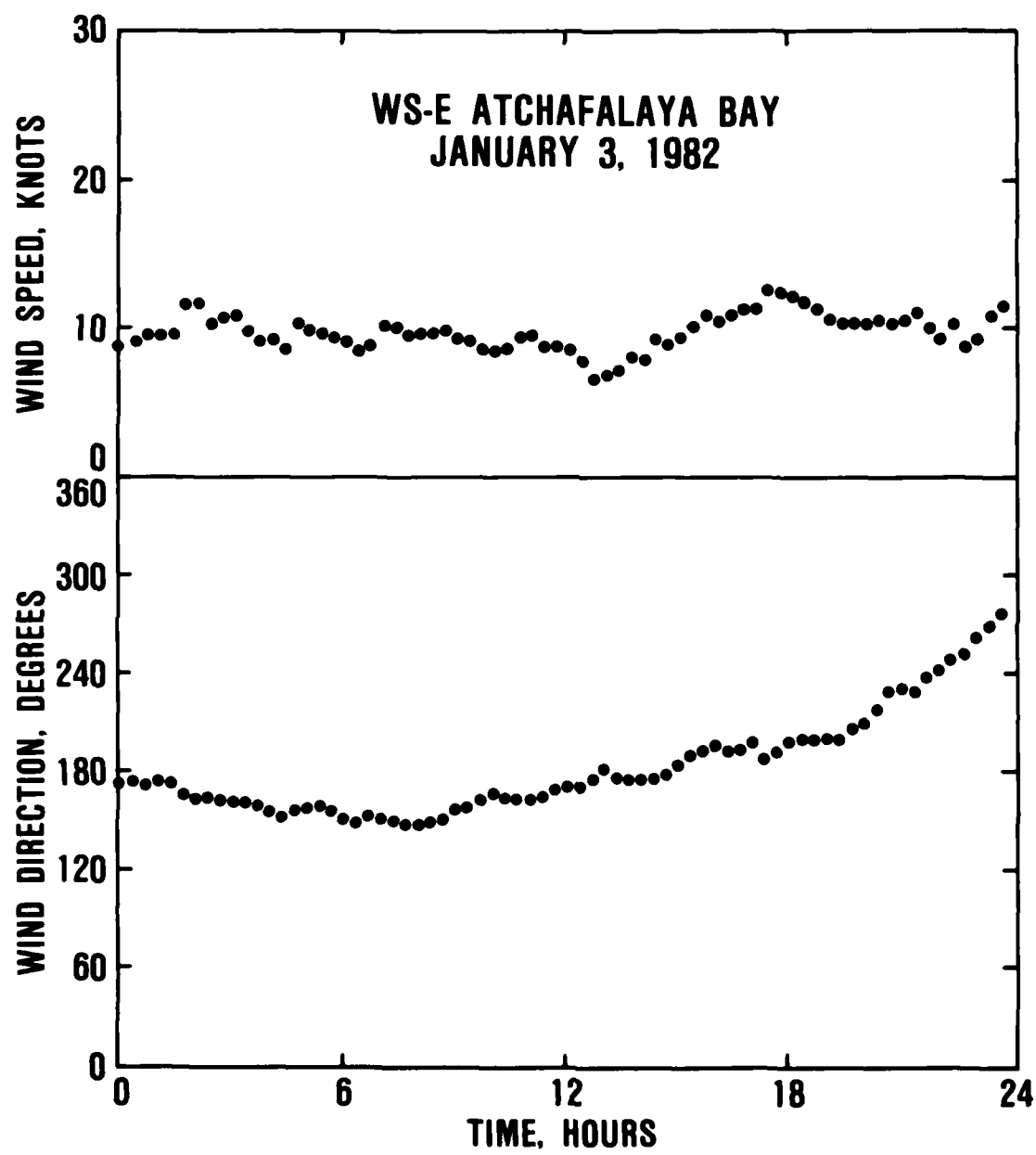


Figure 6. Prototype wind measurements during FGR circulation

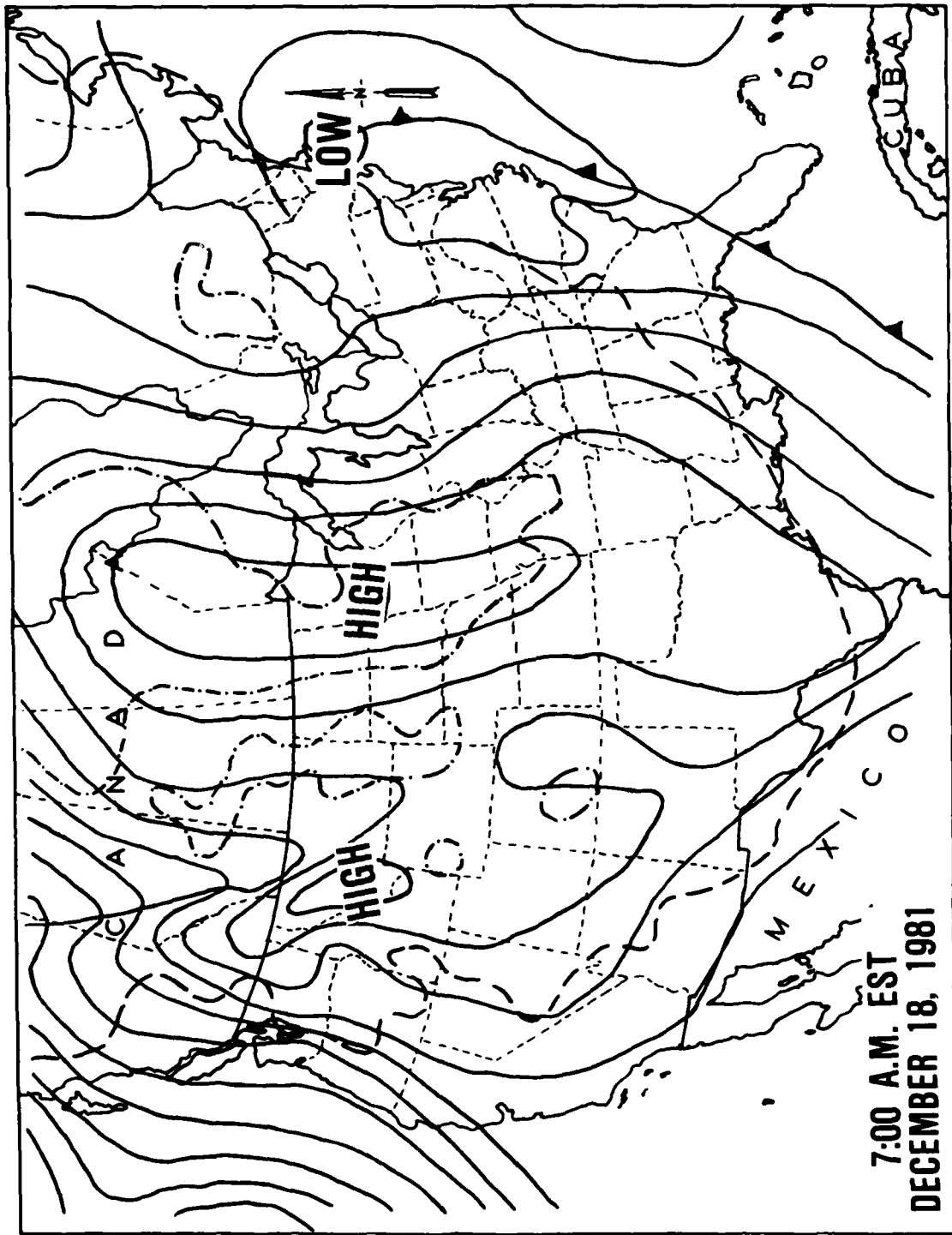


Figure 7. Isobaric contour map of CH circulation

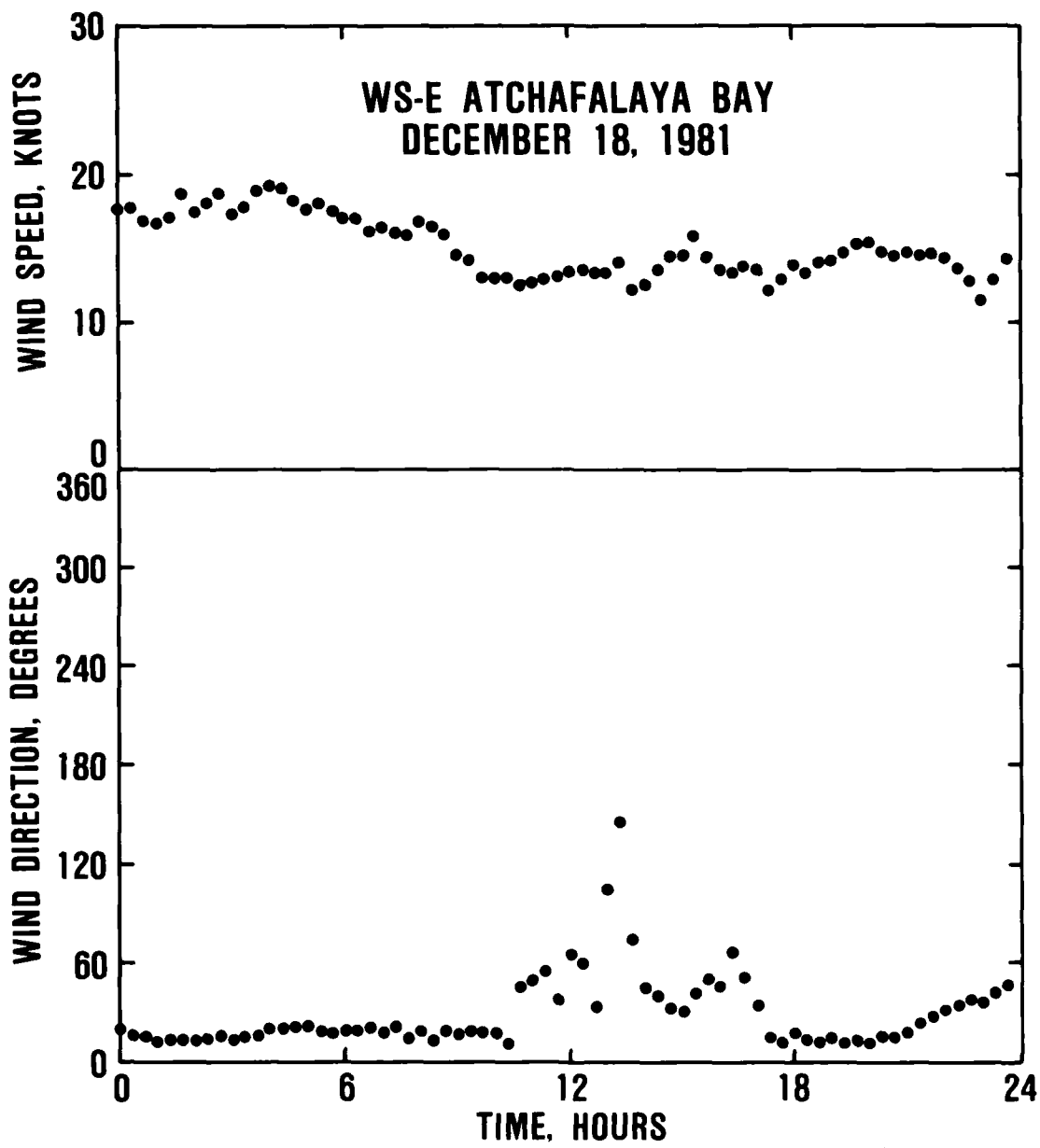


Figure 8. Prototype wind measurements during CH circulation

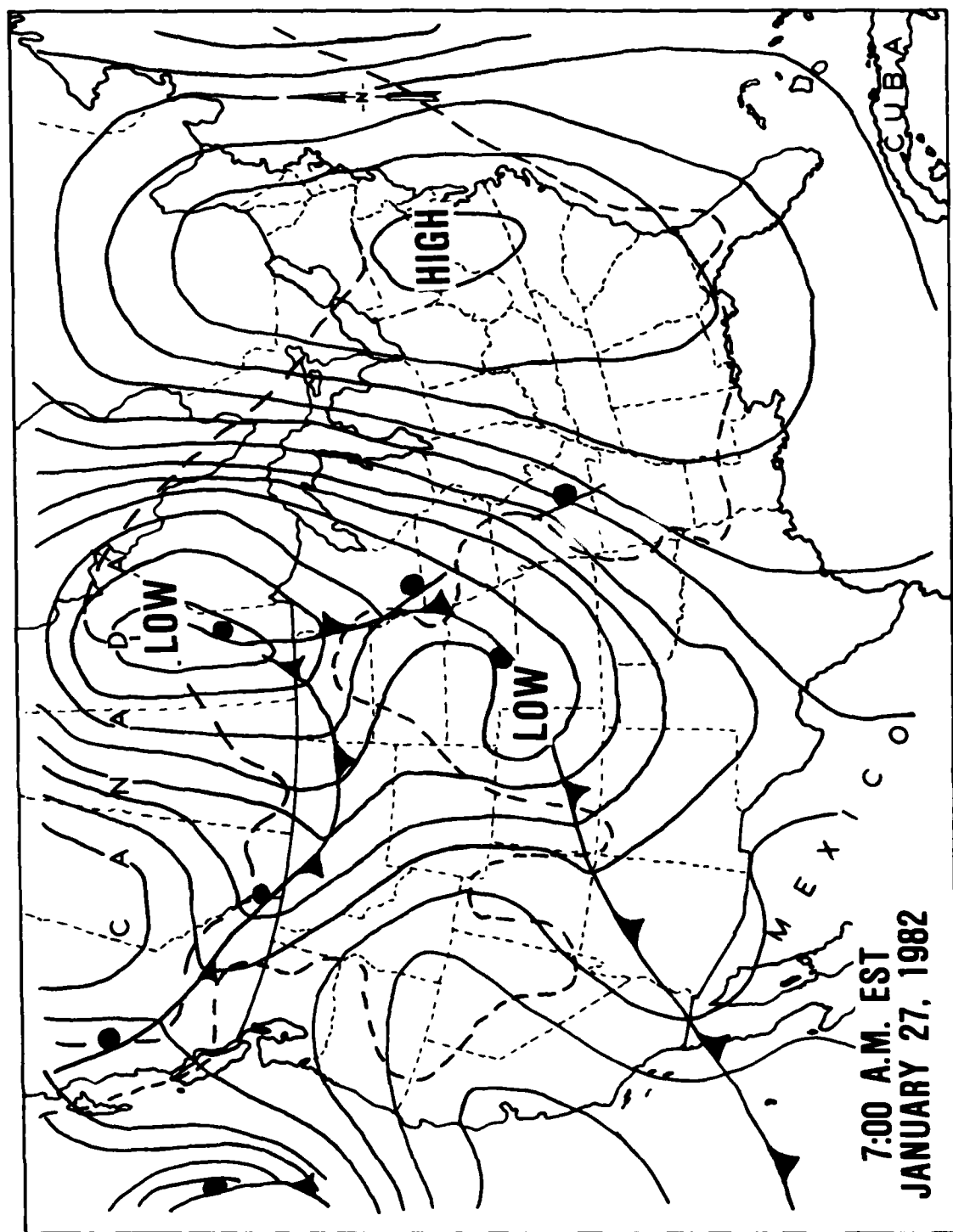


Figure 9. Isobaric contour map of CR circulation

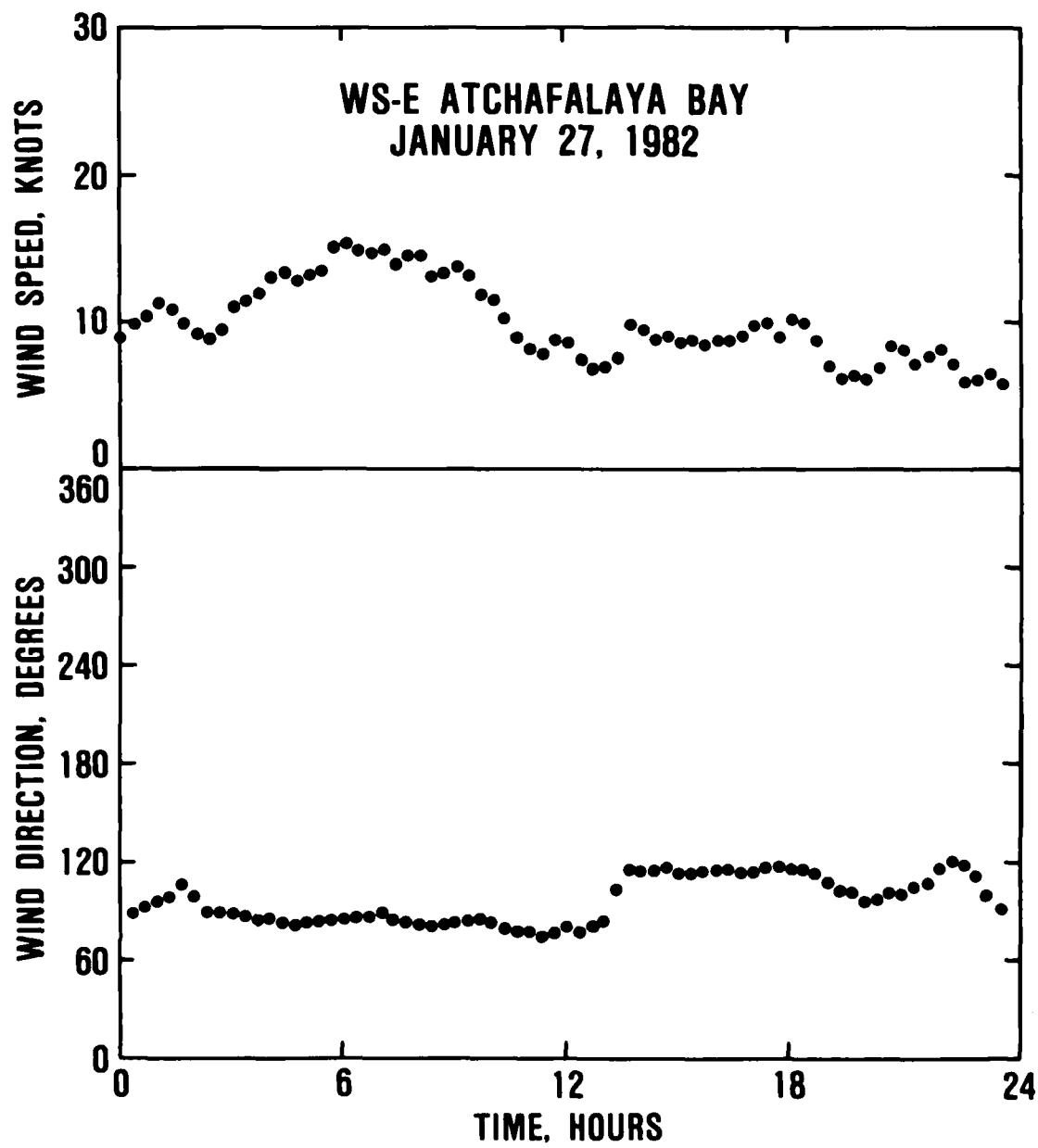


Figure 10. Prototype wind measurements during CR circulation

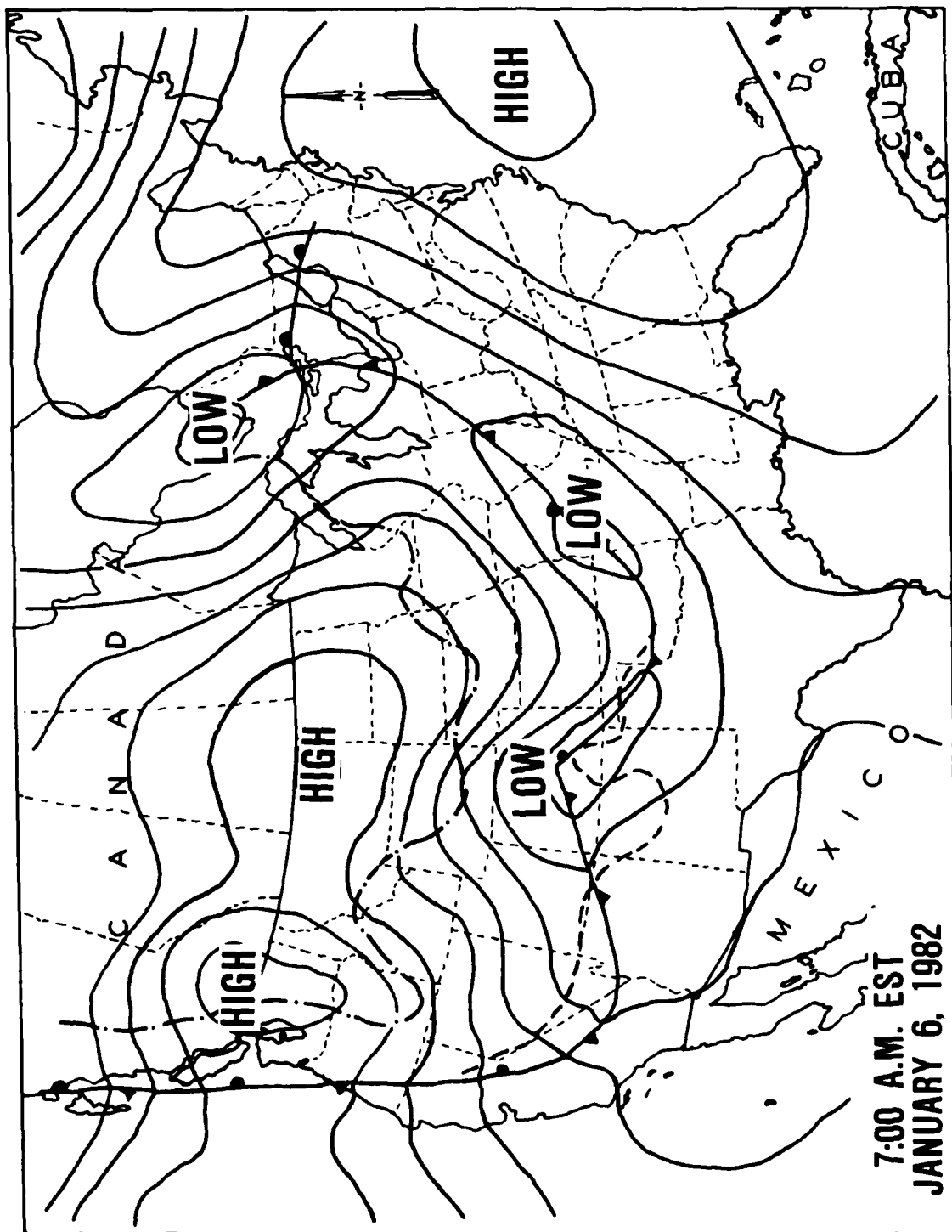


Figure 11. Isobaric contour map of GR circulation

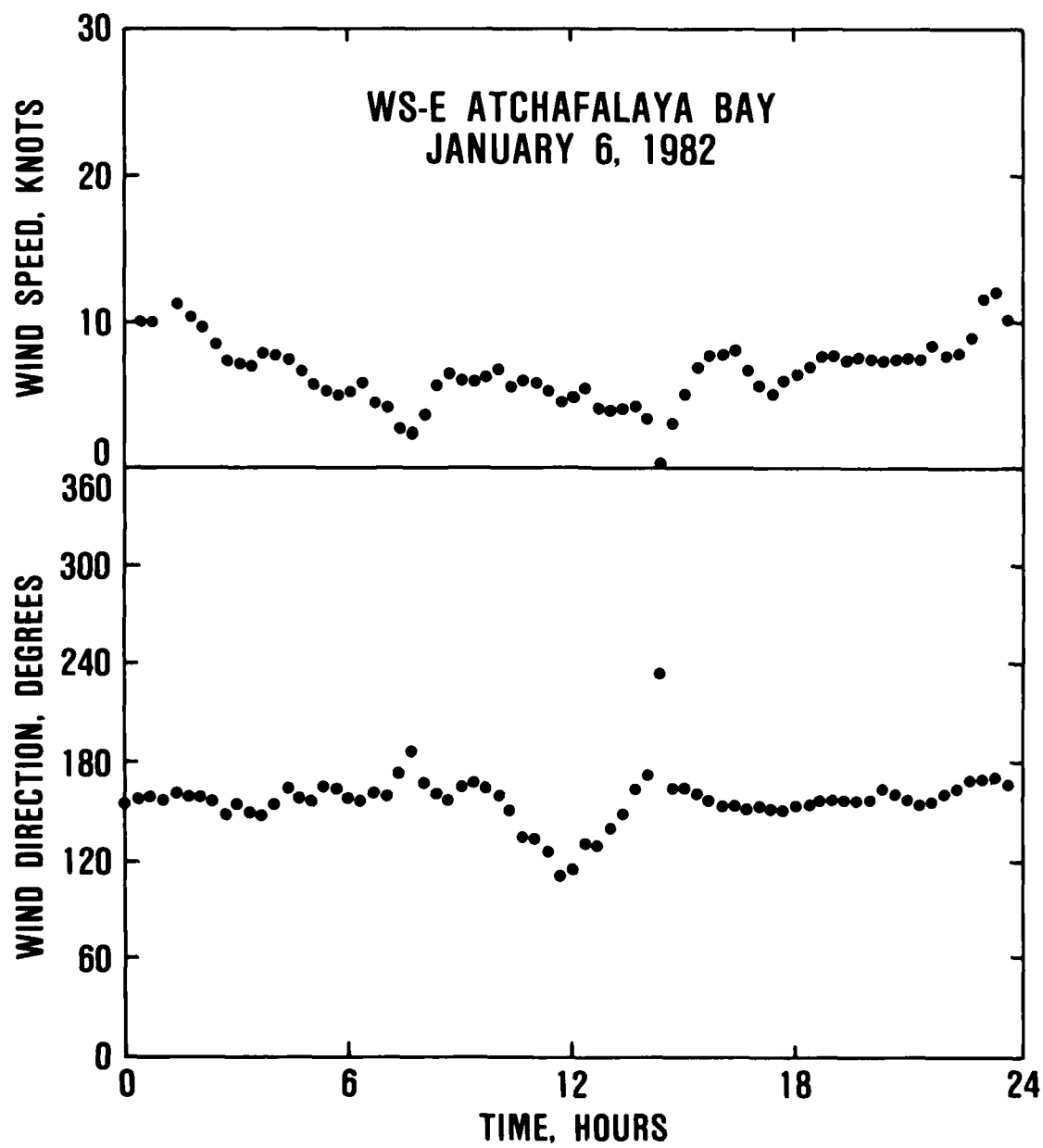


Figure 12. Prototype wind measurements during GR circulation

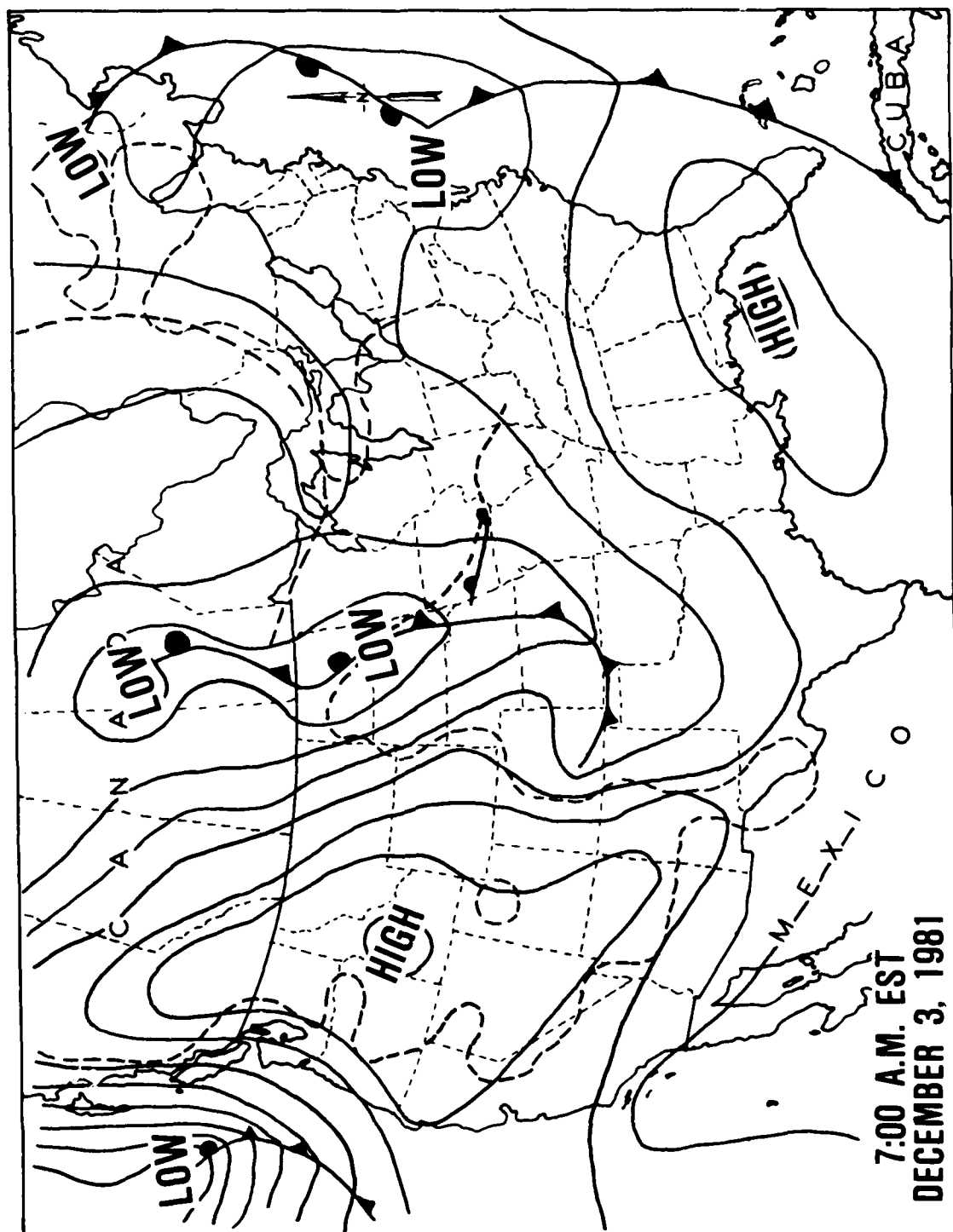


Figure 13. Isobaric contour map of GH circulation

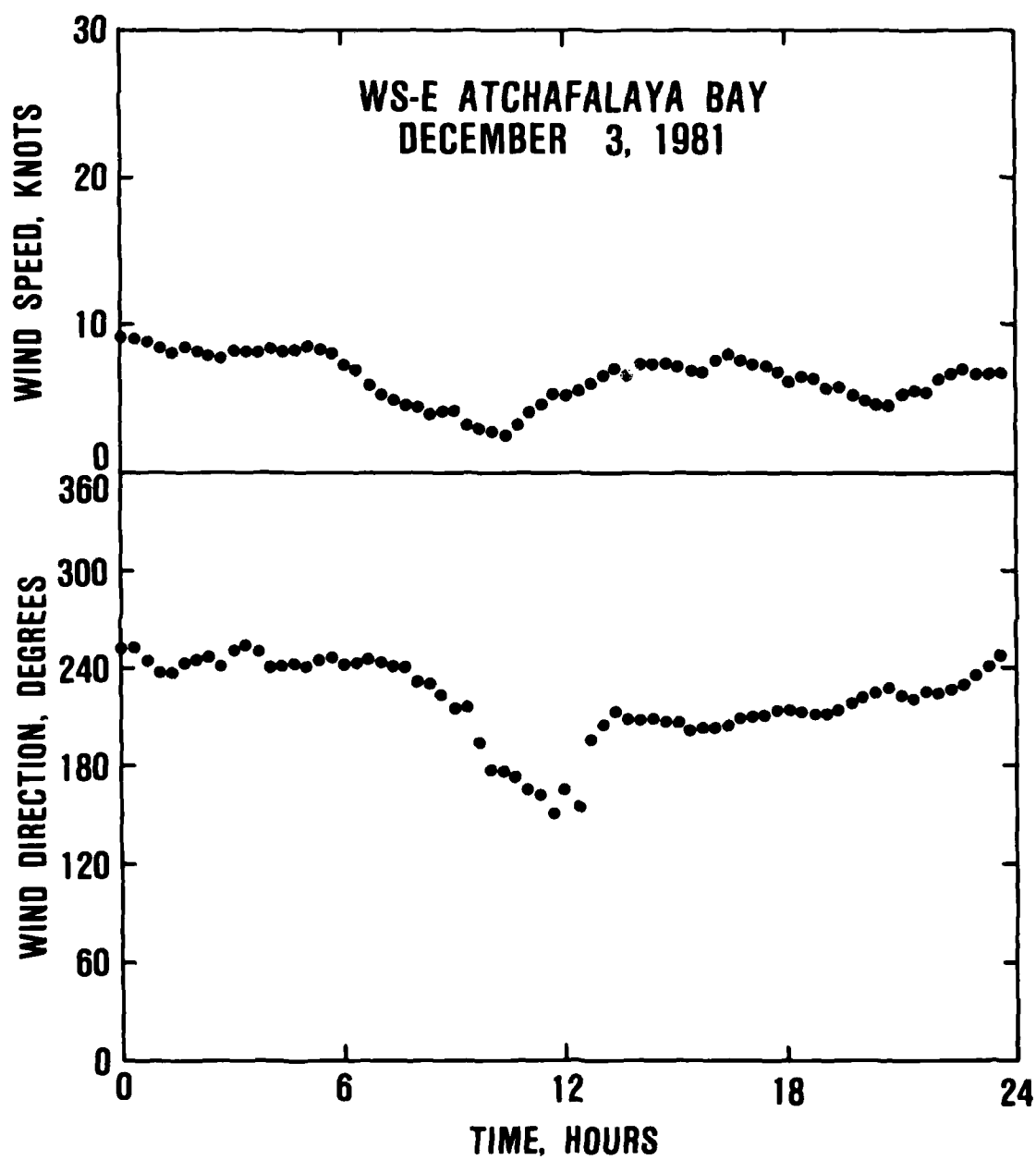


Figure 14. Prototype wind measurements during GH circulation

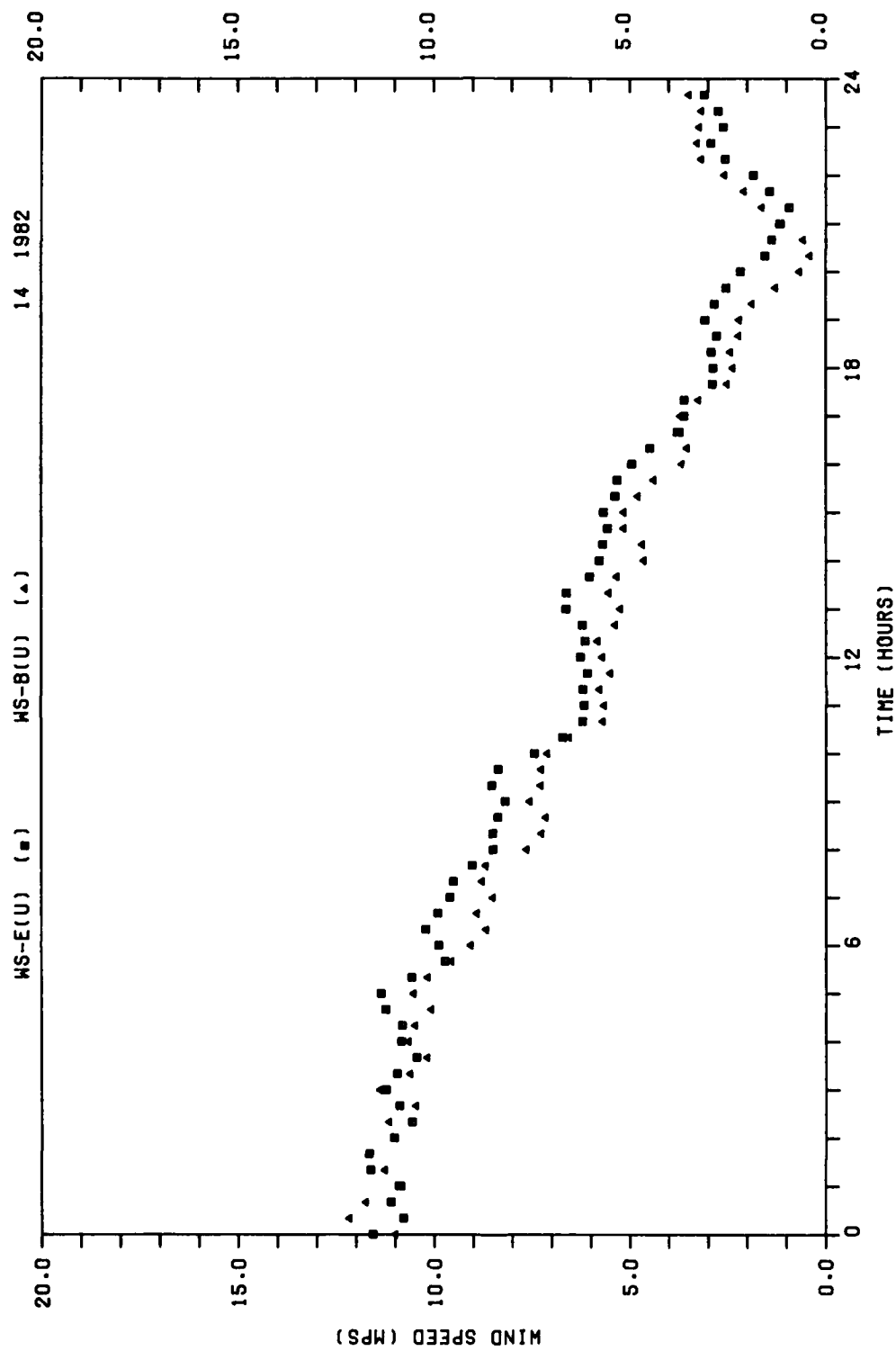


Figure 15. Comparison of wind speed at stations WS-E and WS-B

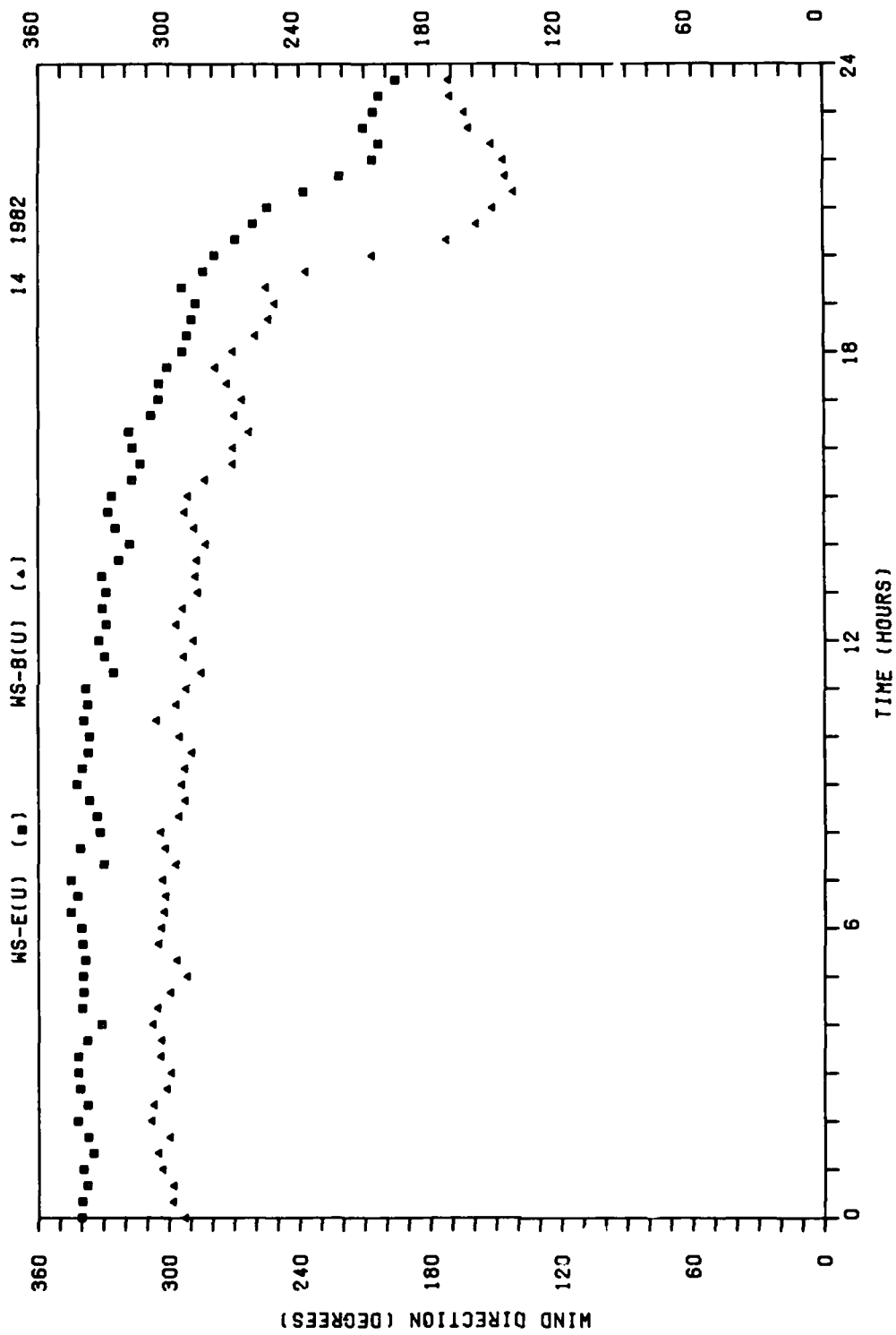


Figure 16. Comparison of wind direction at stations WS-E and WS-B

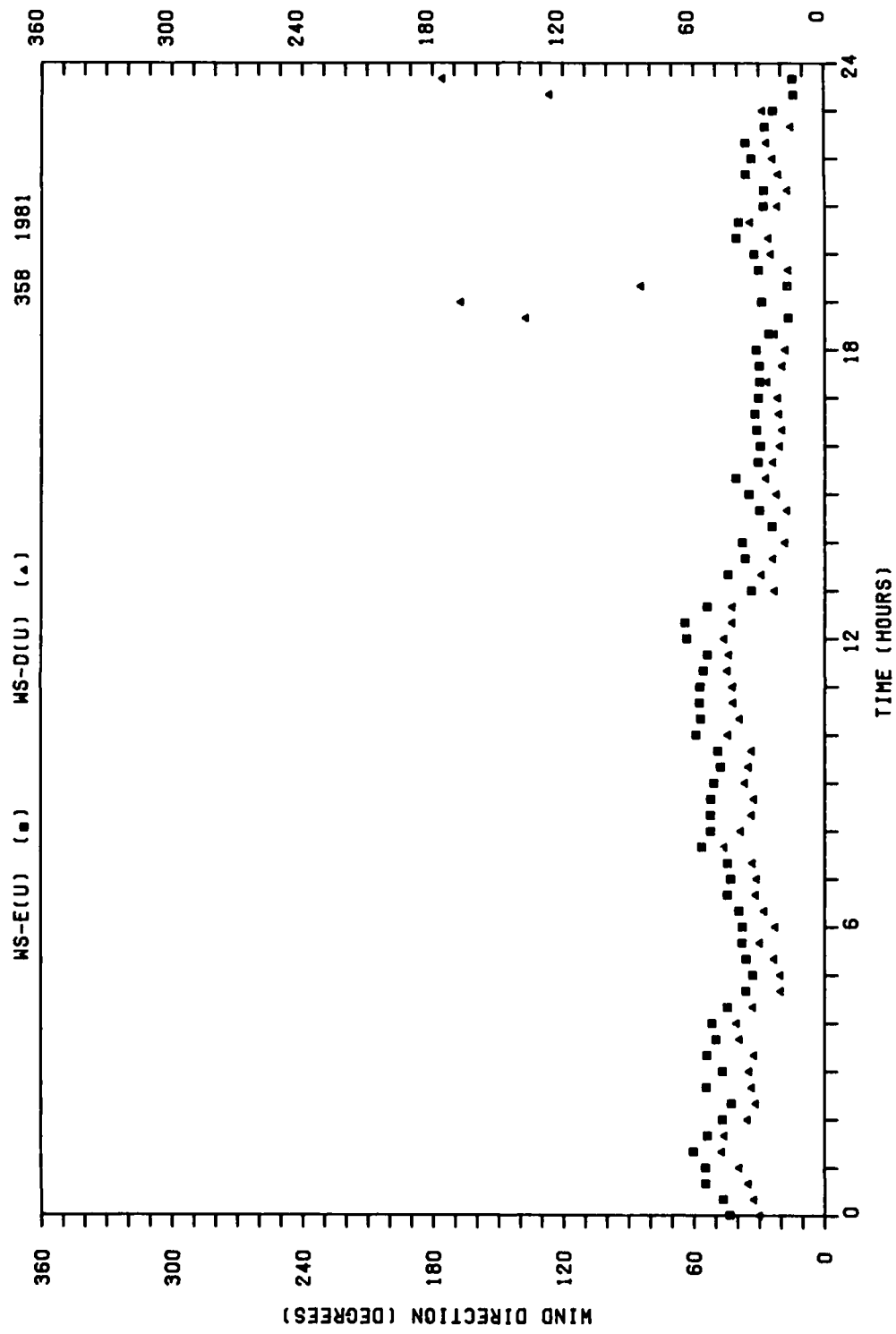


Figure 17. Comparison of wind speed at stations WS-E and WS-D

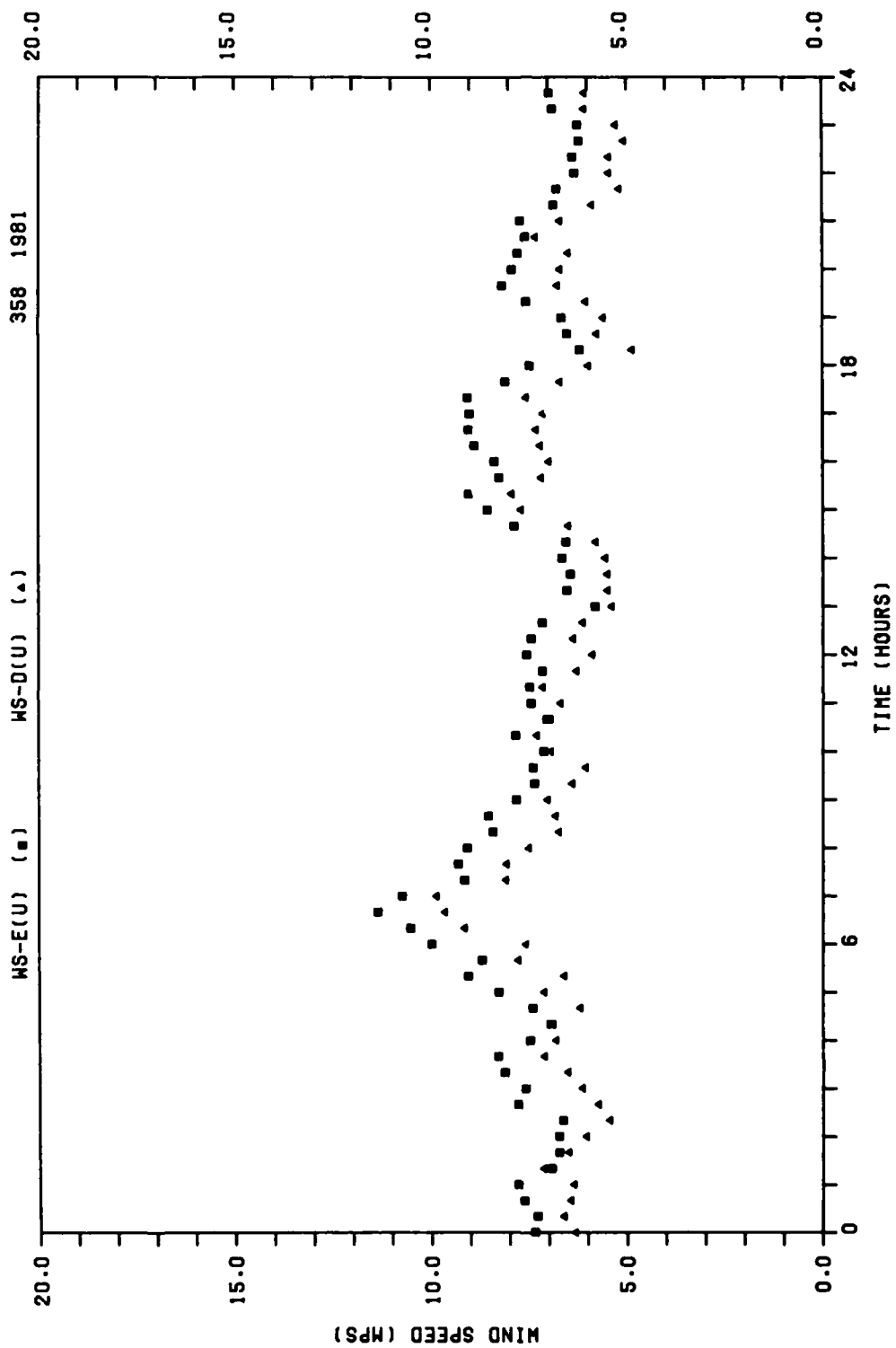


Figure 18. Comparison of wind direction at stations WS-E and WS-D

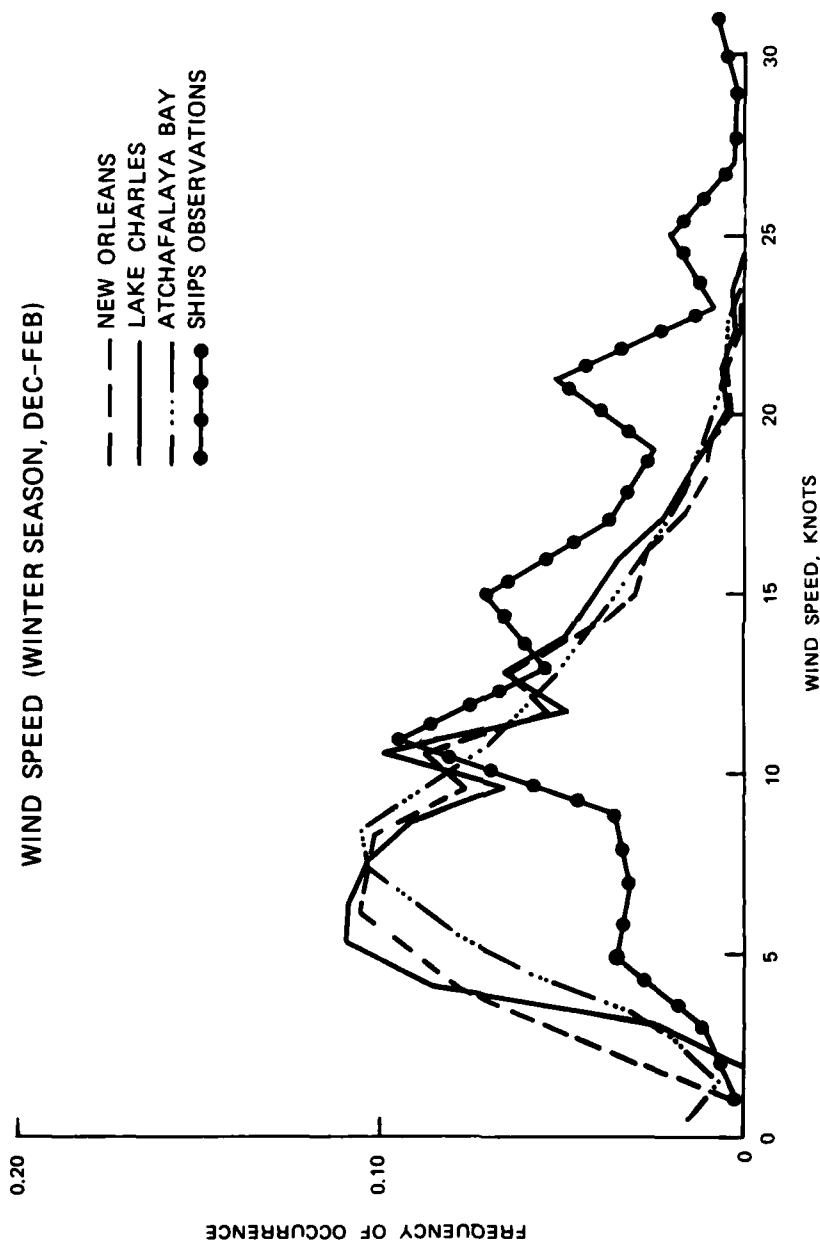


Figure 19. Frequency of occurrence of wind speed during winter
(all weather types)

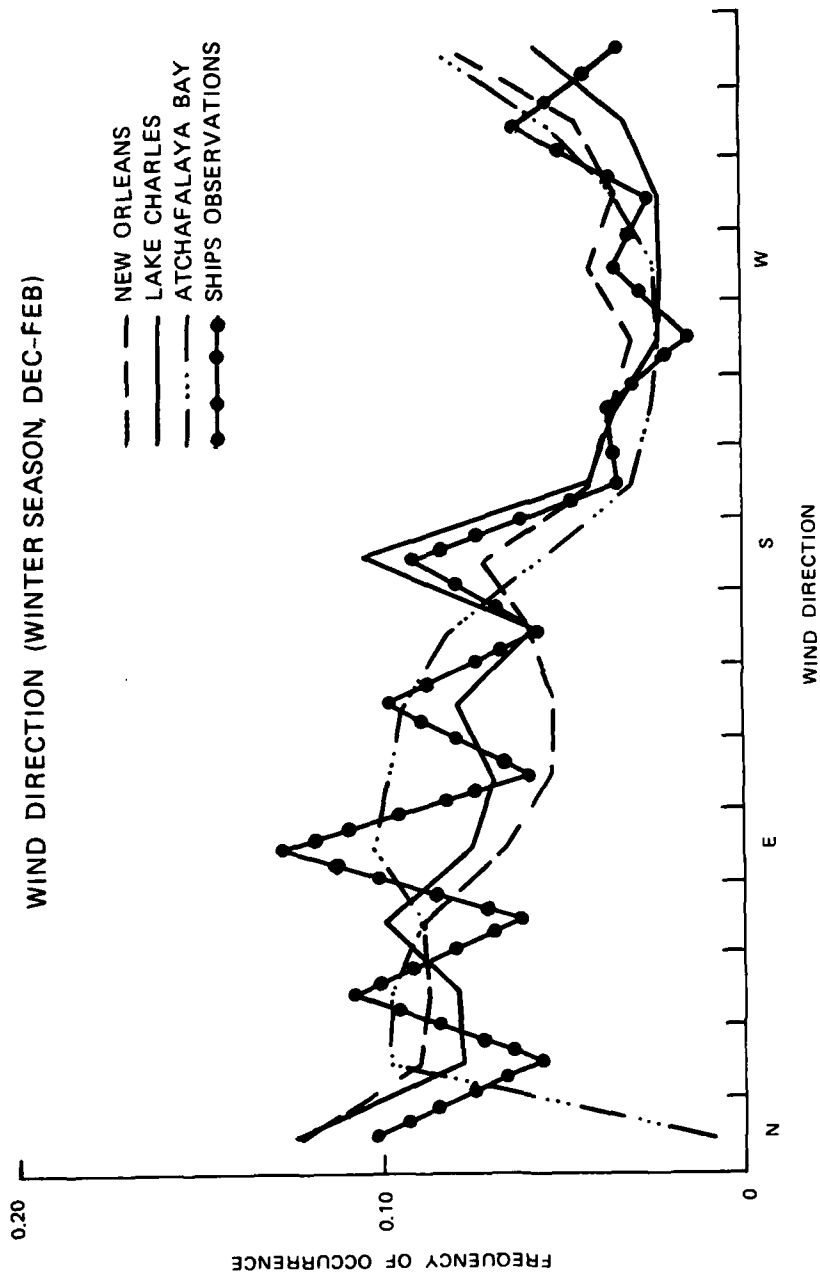


Figure 20. Frequency of occurrence of wind direction during winter
(all weather types)

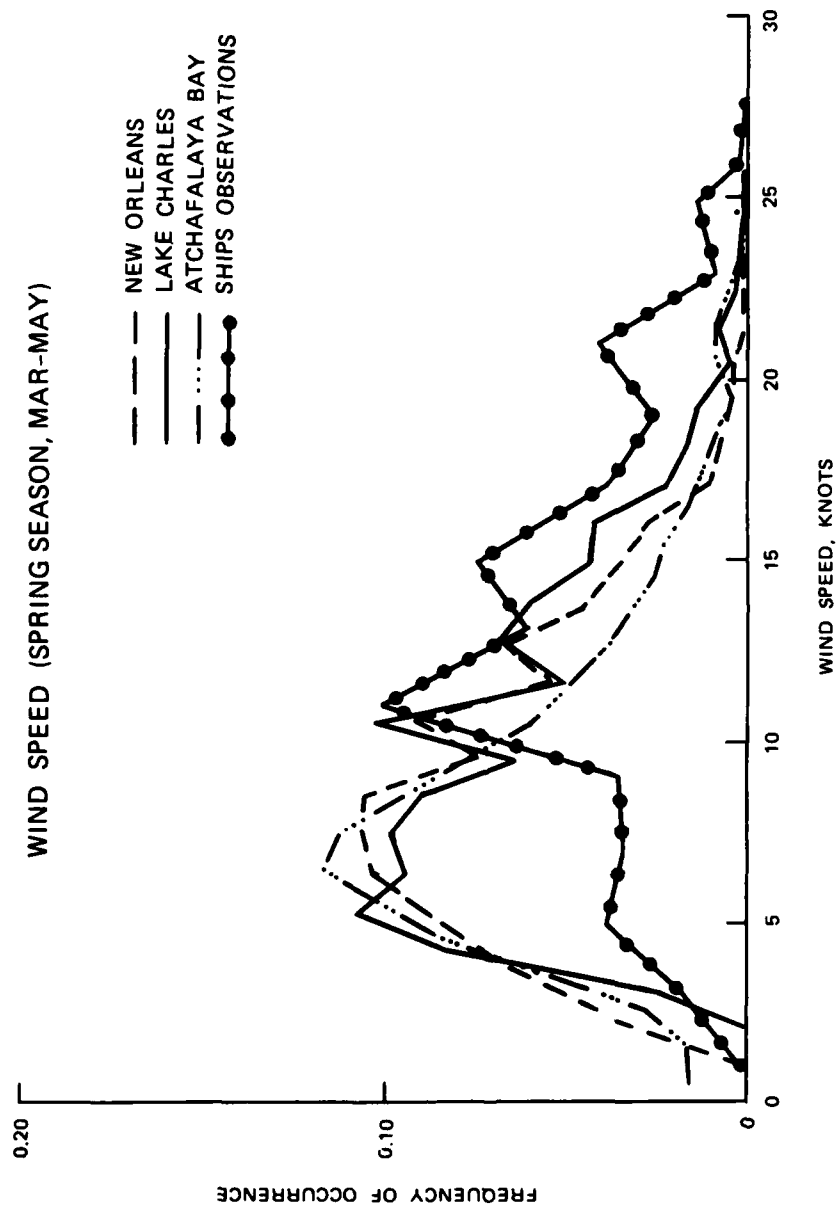


Figure 21. Frequency of occurrence of wind speed during spring
(all weather types)

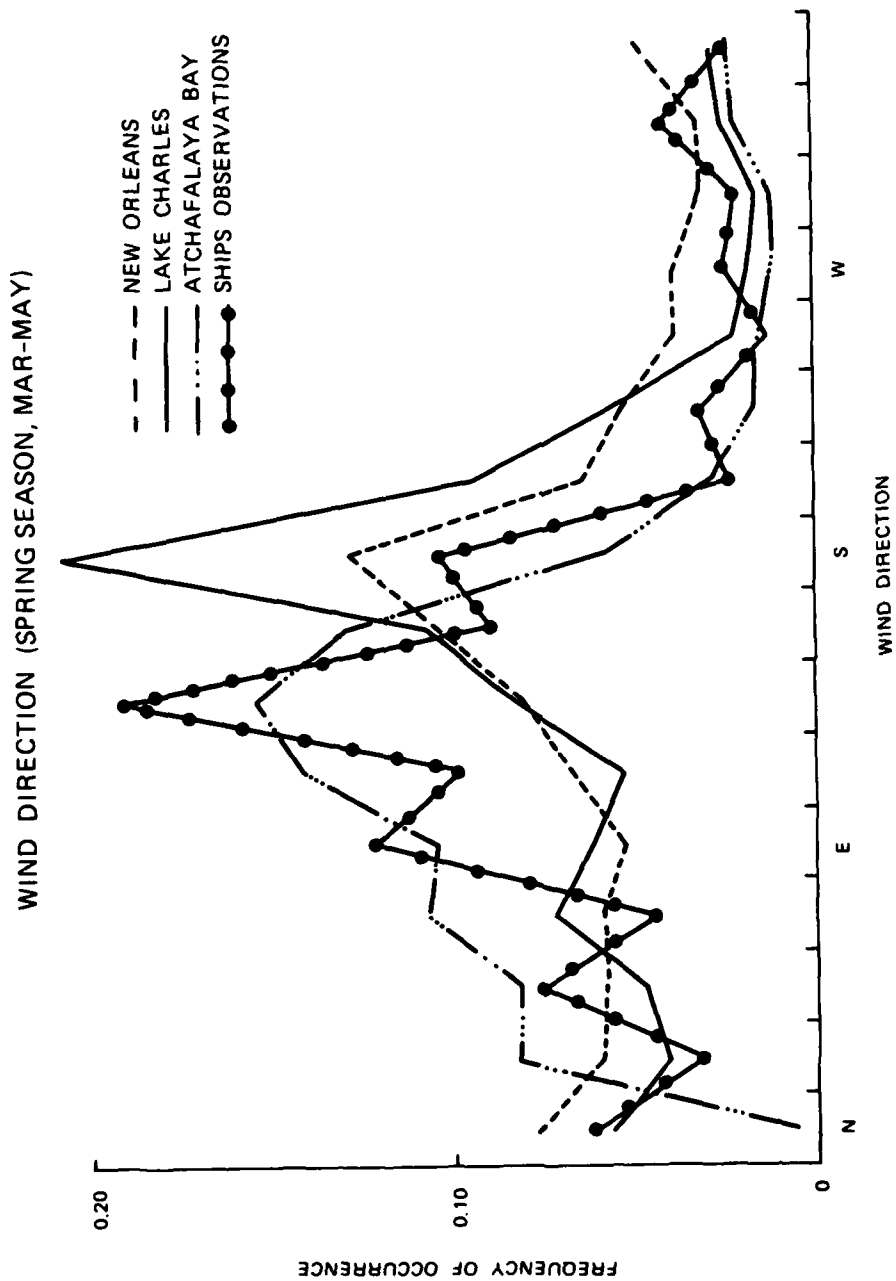


Figure 22. Frequency of occurrence of wind direction during spring
(all weather types)

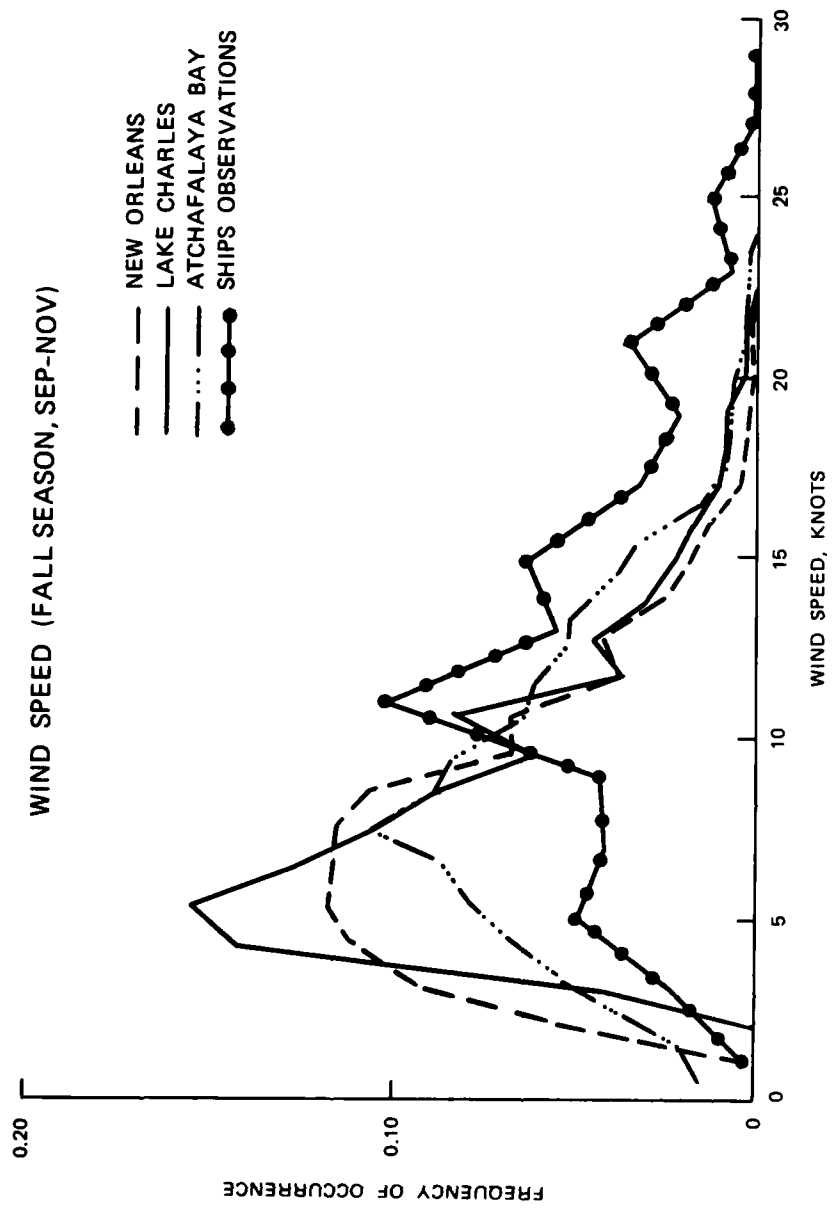


Figure 23. Frequency of occurrence of wind speed during summer (all weather types)

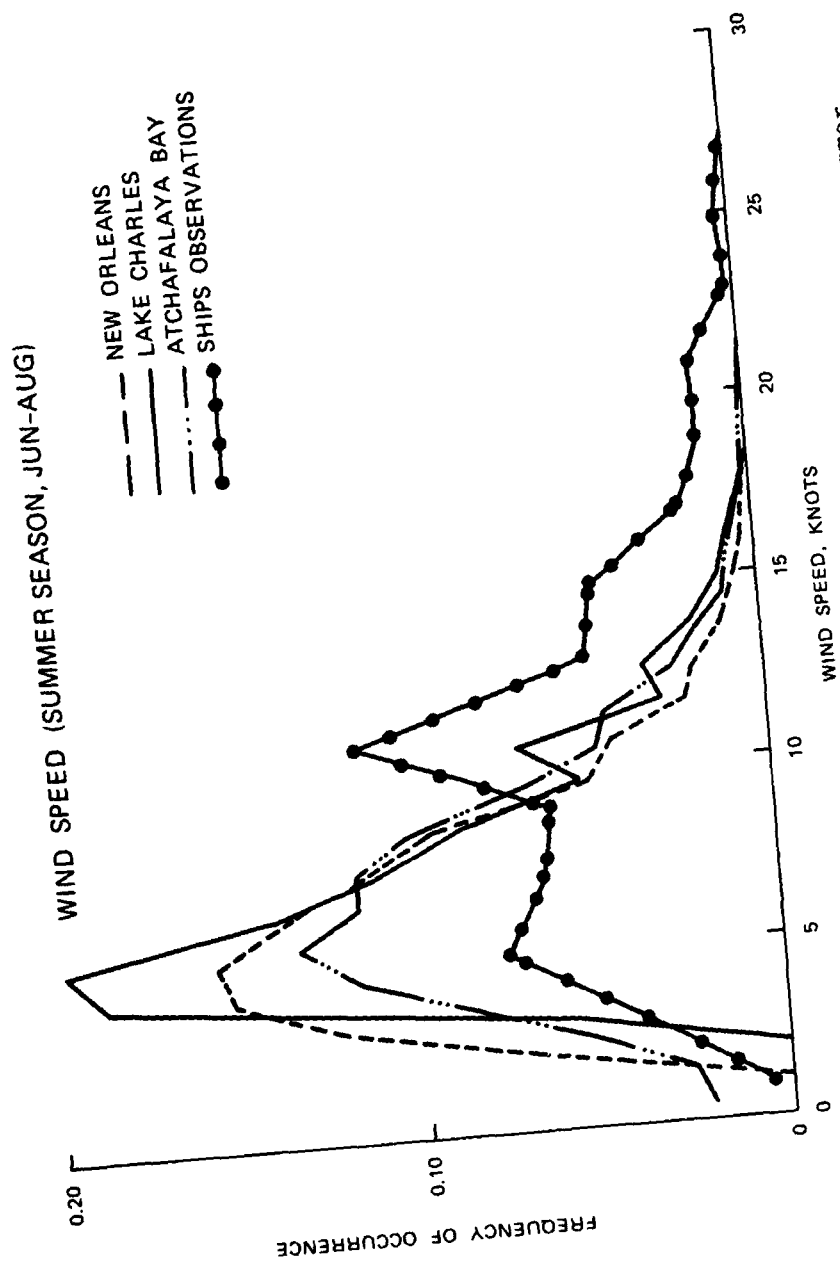


Figure 24. Frequency of occurrence of wind direction during summer (all weather types)

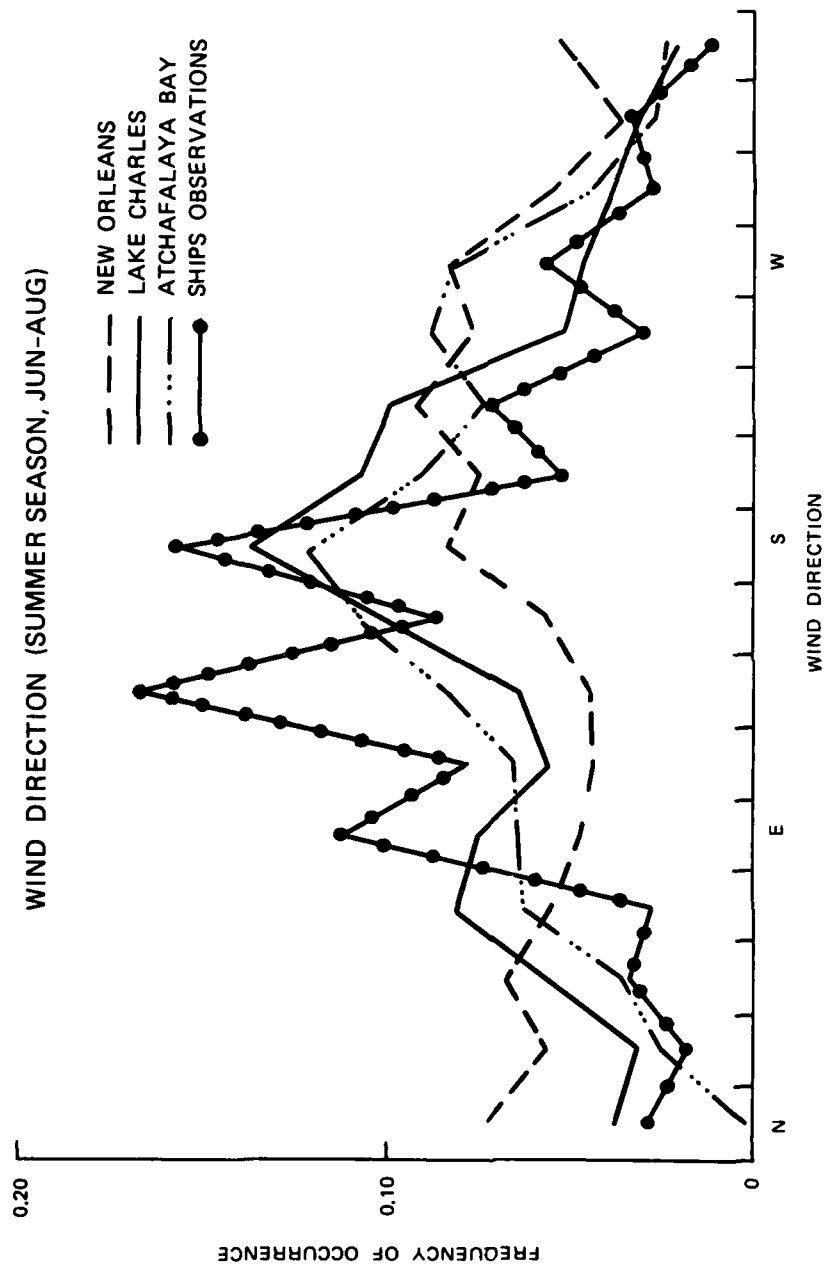


Figure 25. Frequency of occurrence of wind speed during fall
(all weather types)

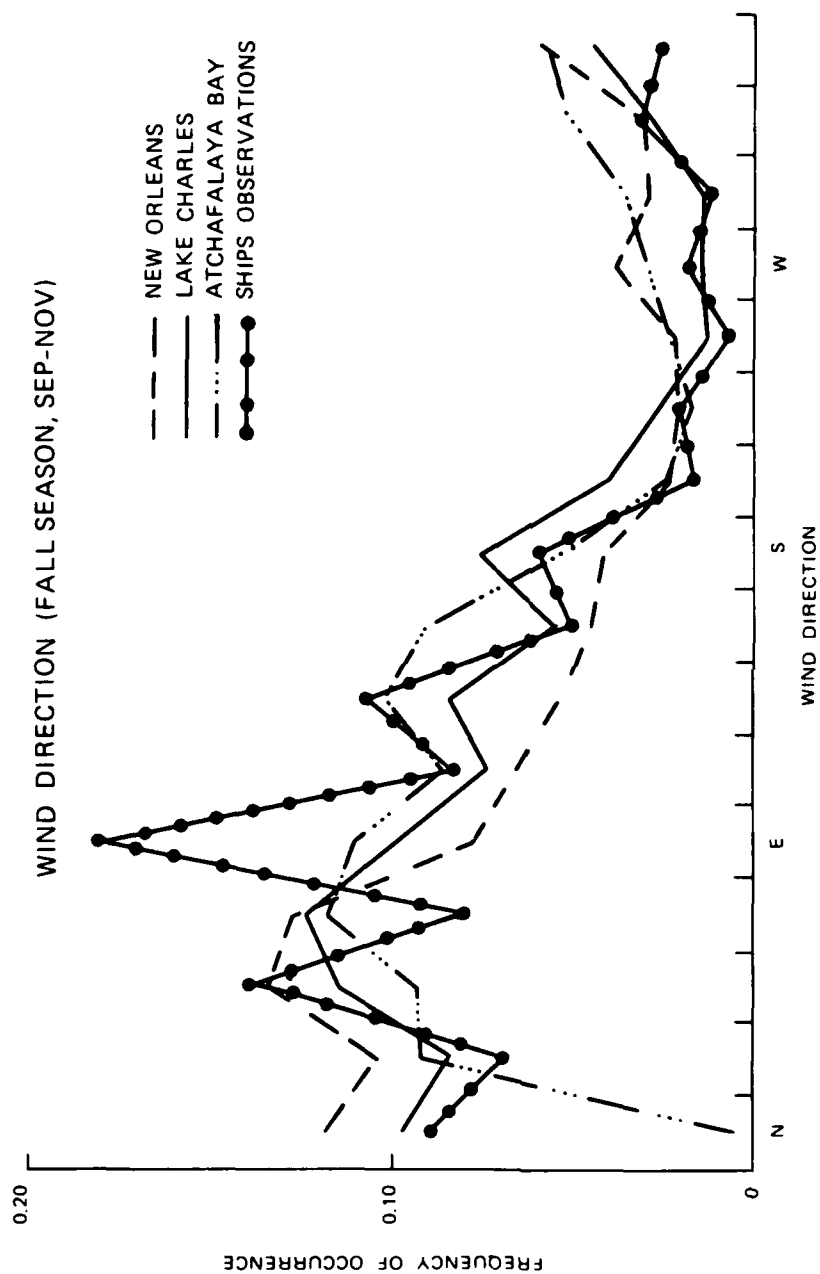


Figure 26. Frequency of occurrence of wind direction during fall
(all weather types)

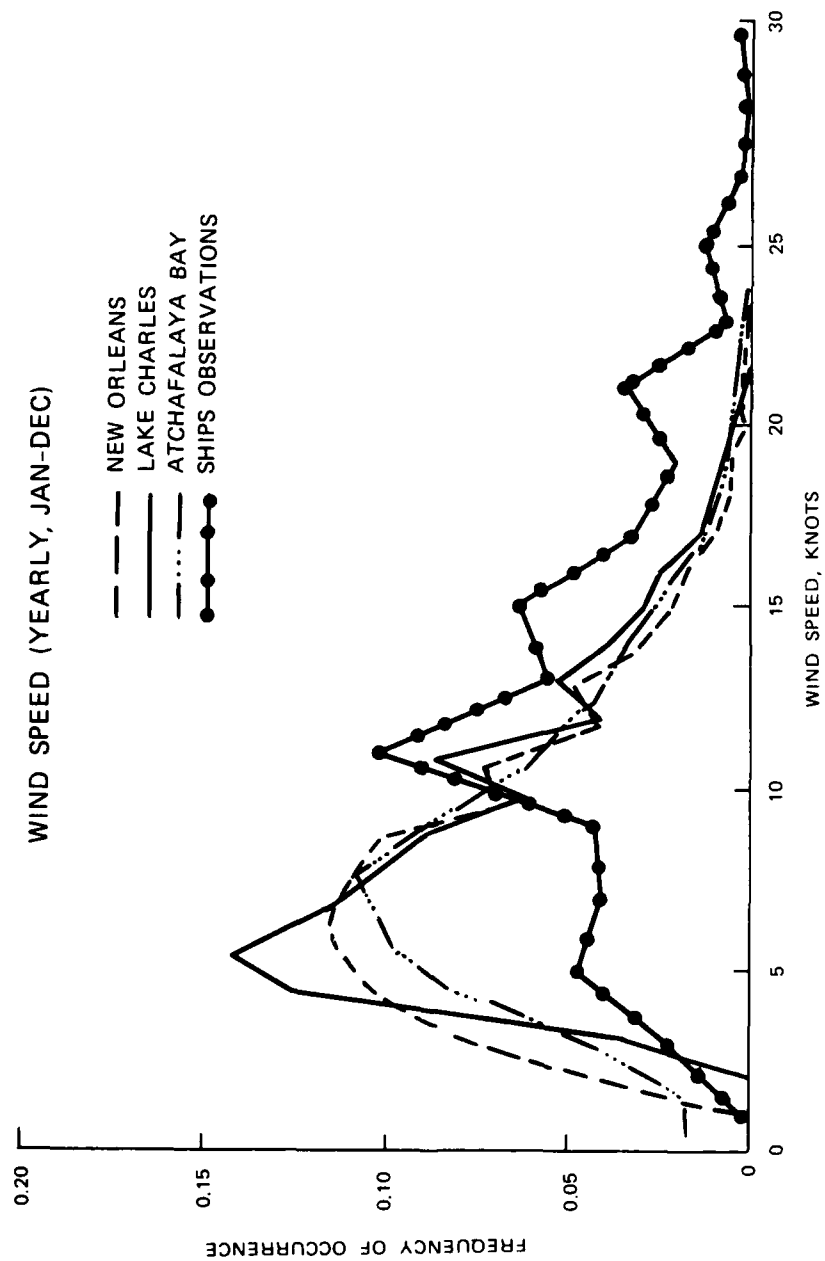


Figure 27. Cumulative yearly frequency of occurrence of wind speed
(all weather types)

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THE ATCHAFALAYA RIVER DELTA REPORT 9 WIND CLIMATOLOGY

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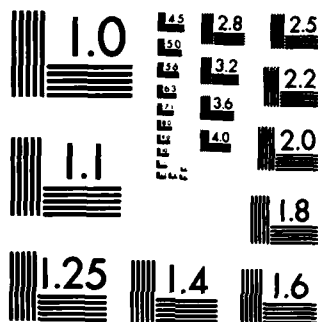
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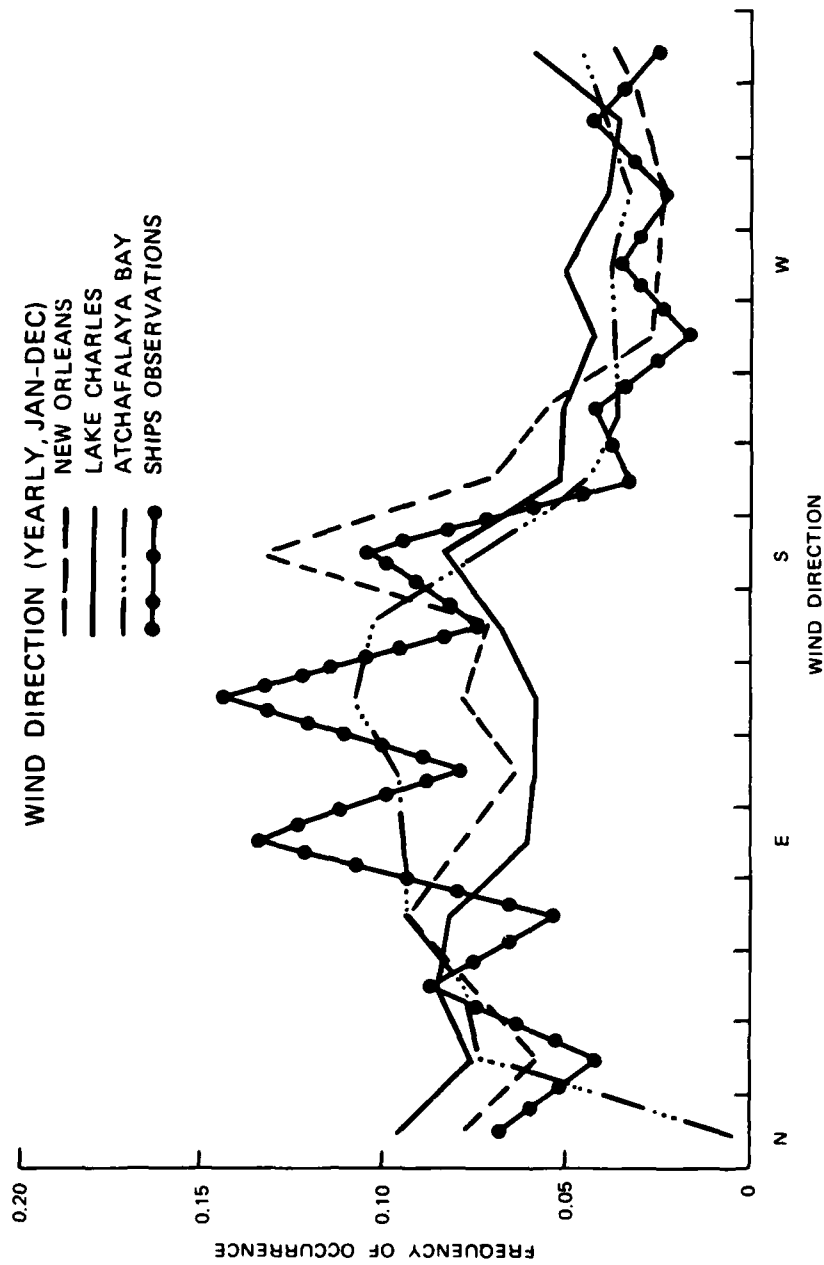


Figure 28. Cumulative yearly frequency of occurrence of wind direction
(all weather types)

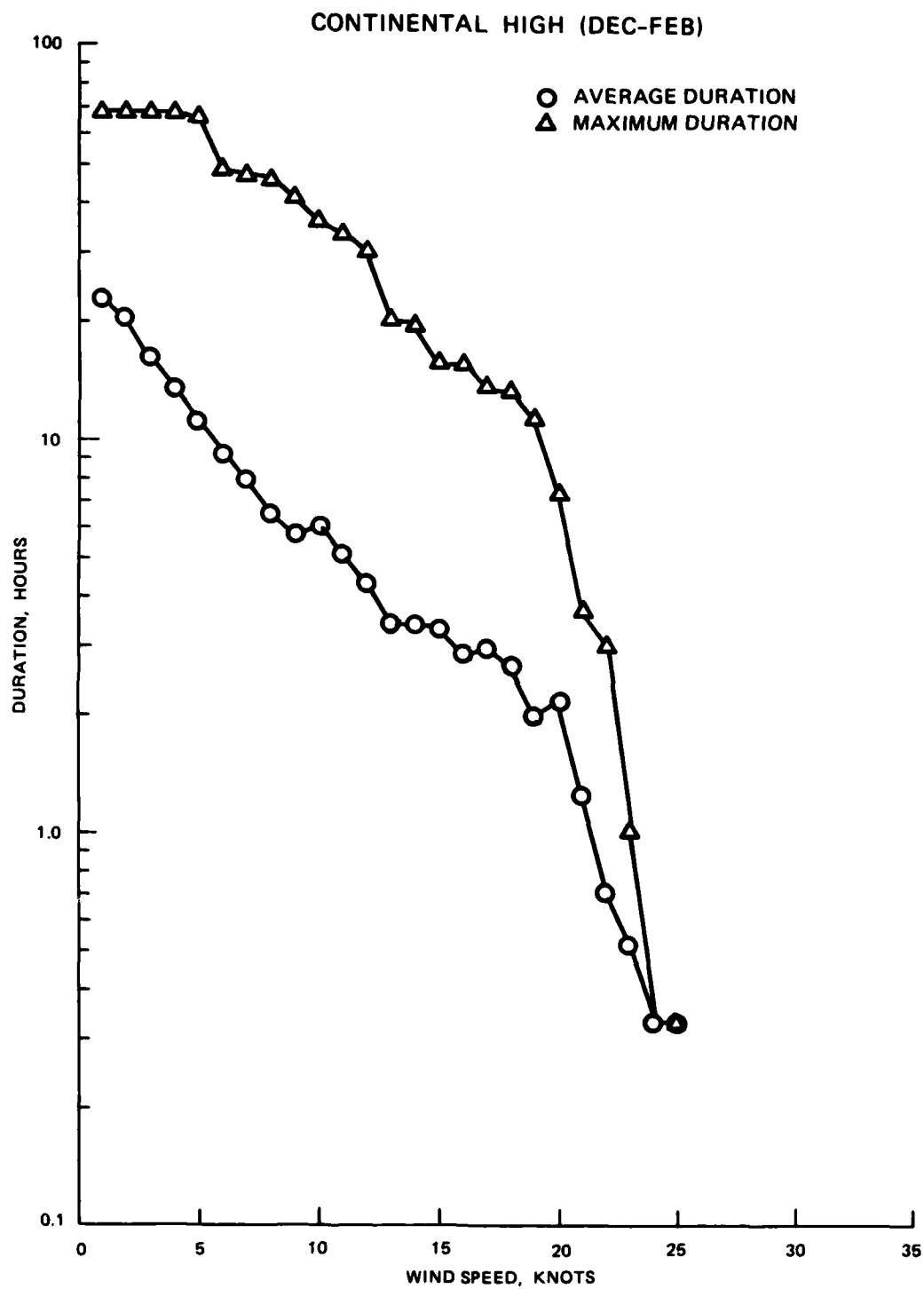


Figure 29. Duration of CH winds during winter

CONTINENTAL HIGH (MAR-MAY)

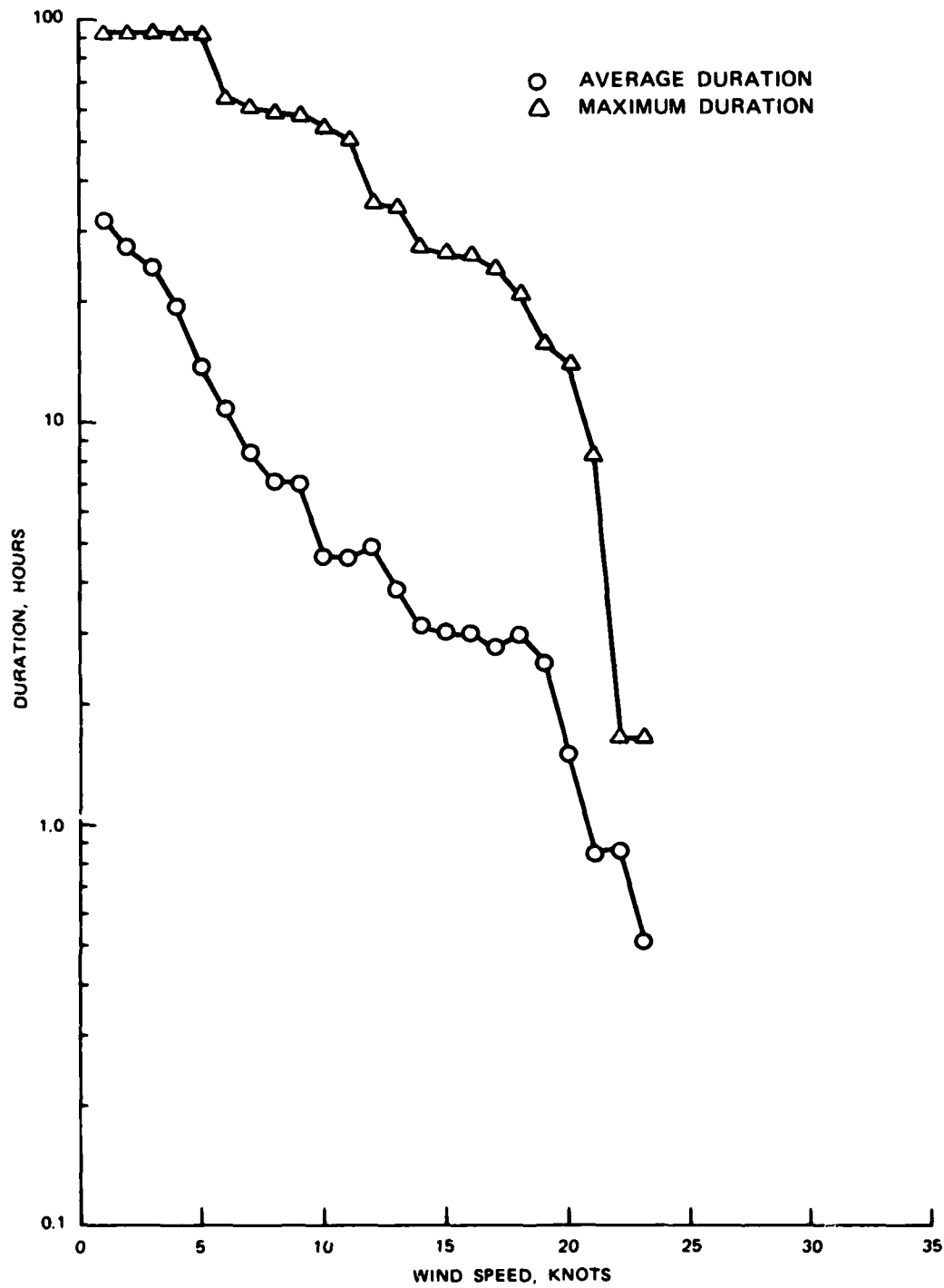


Figure 30. Duration of CH winds during spring

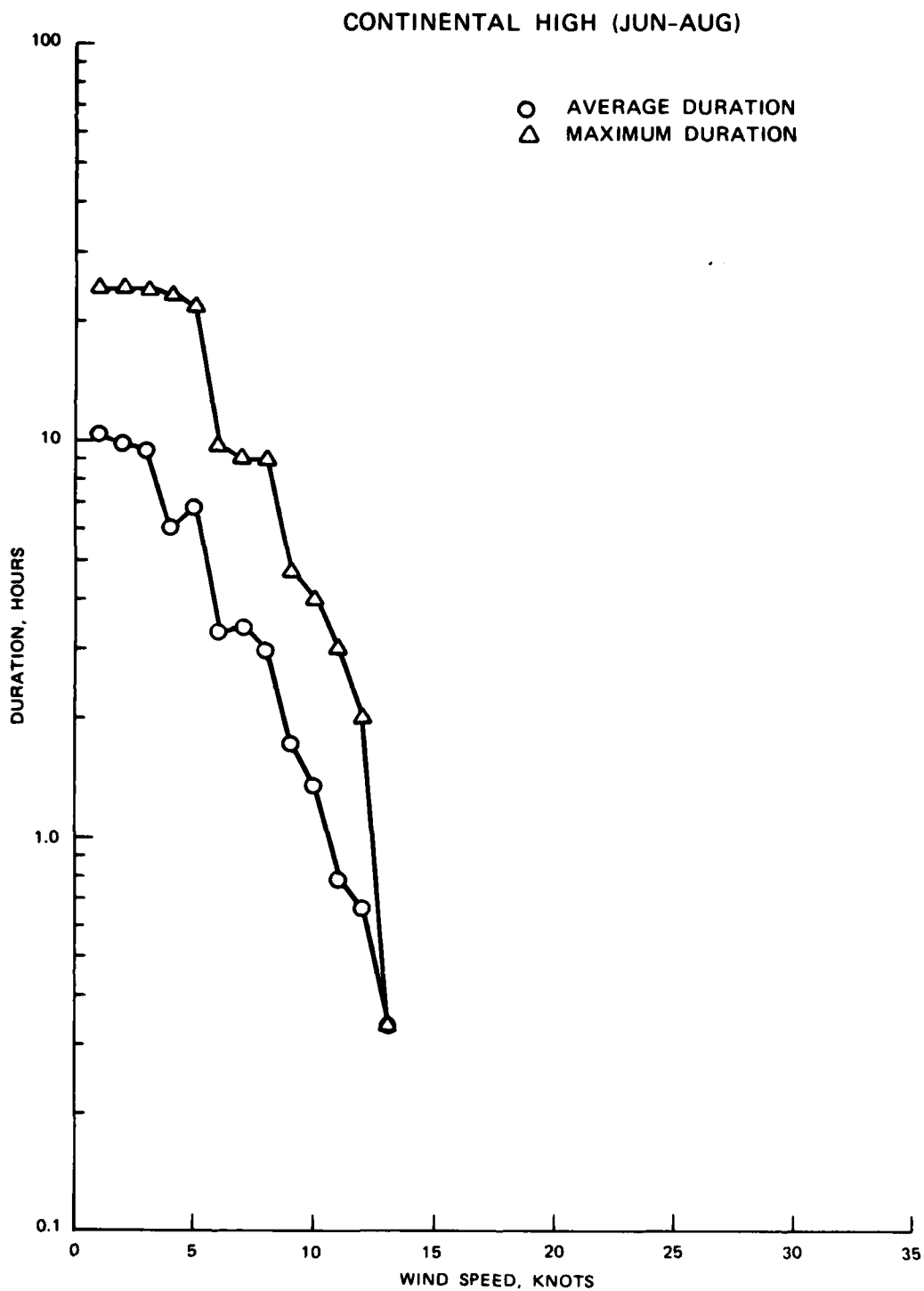


Figure 31. Duration of CH winds during summer

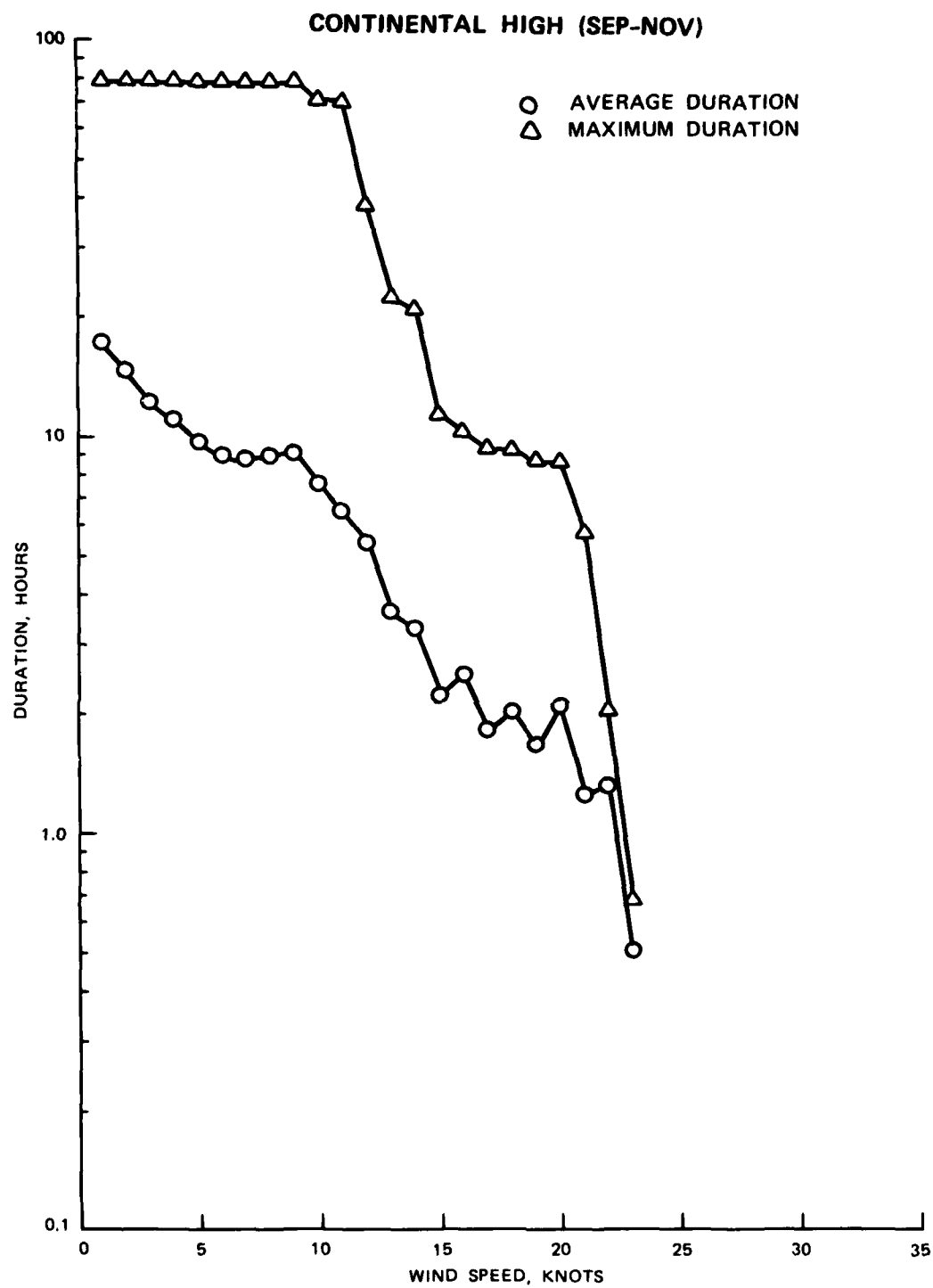


Figure 32. Duration of CH winds during fall

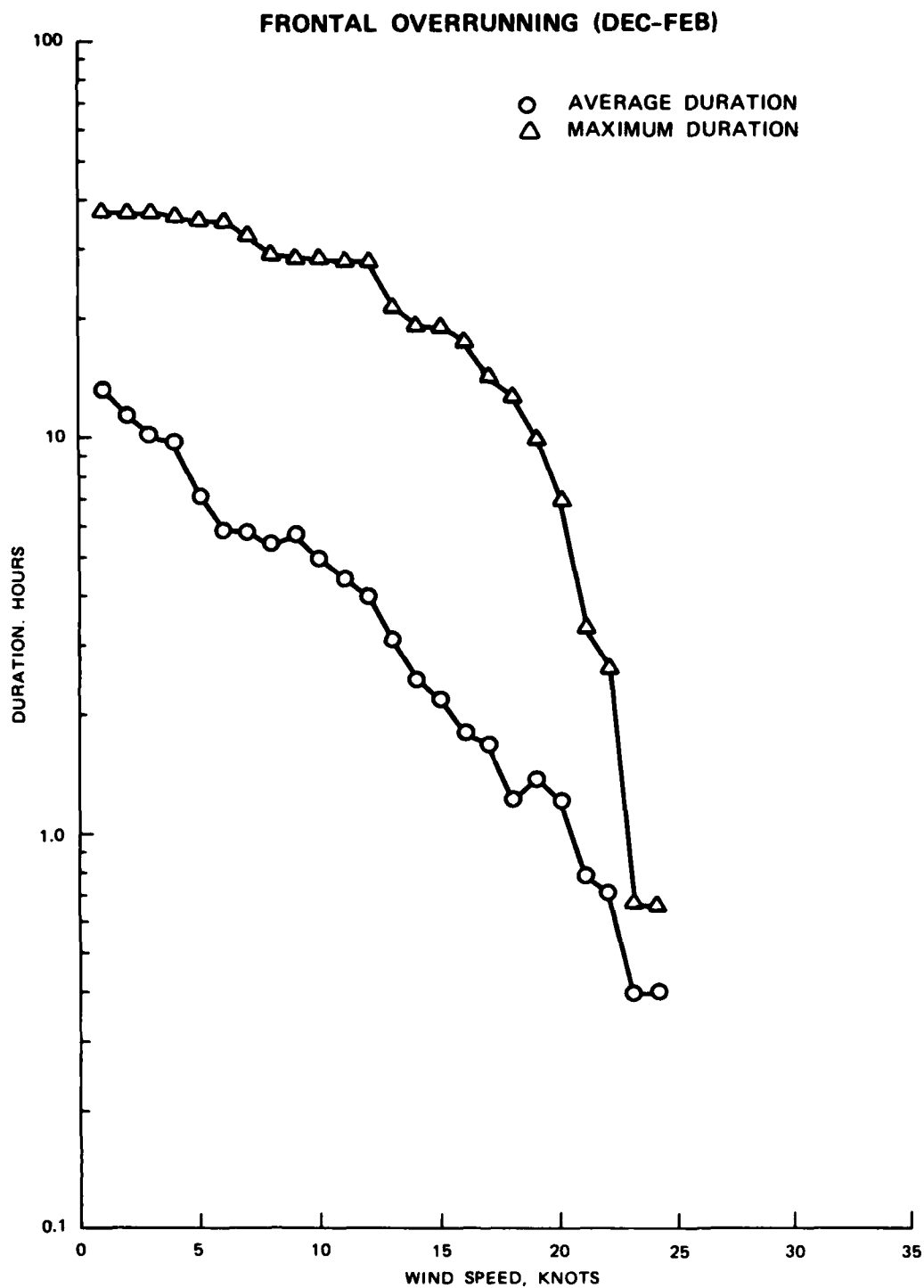


Figure 33. Duration of FOR winds during winter

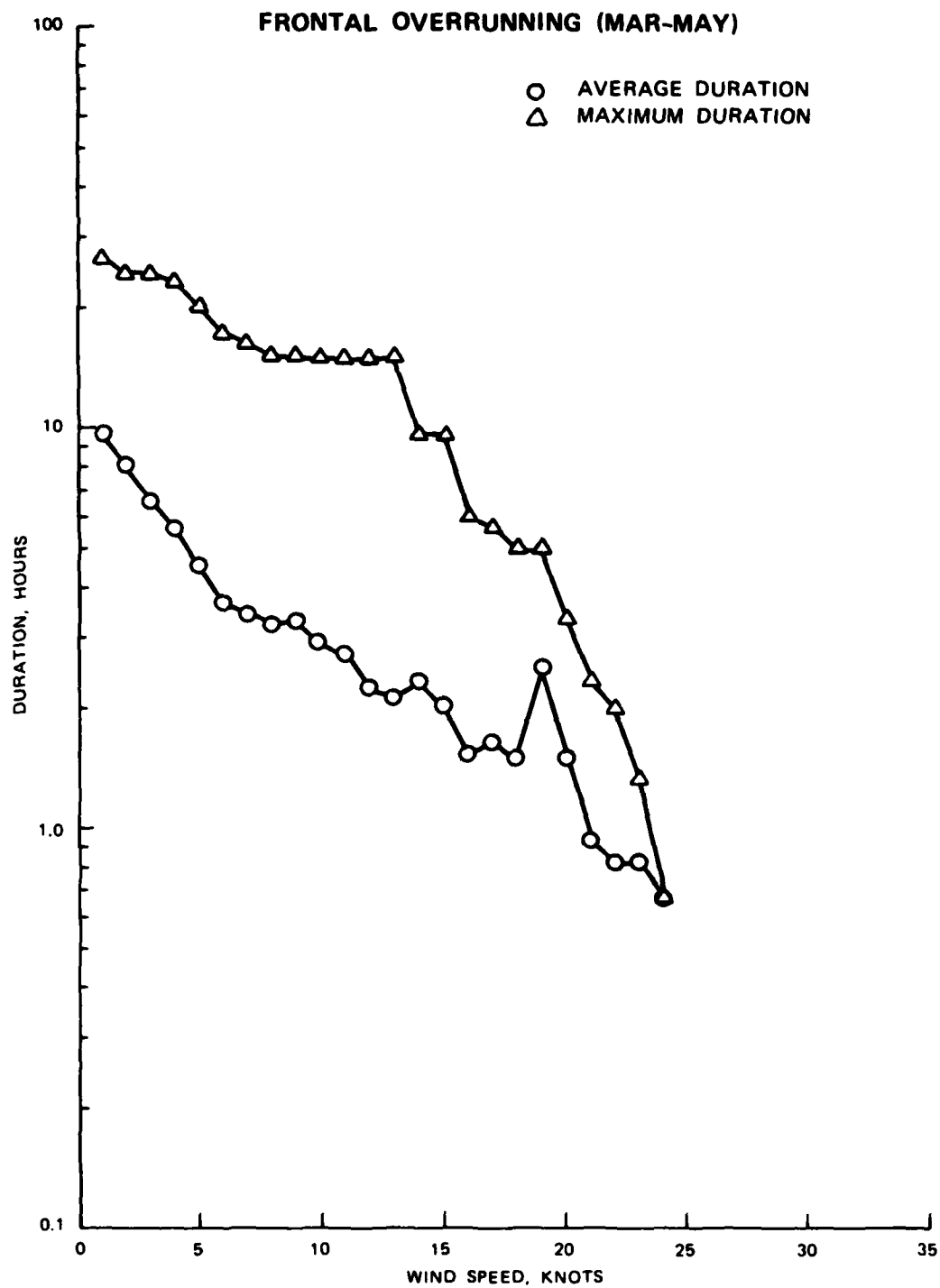


Figure 34. Duration of FOR winds during spring

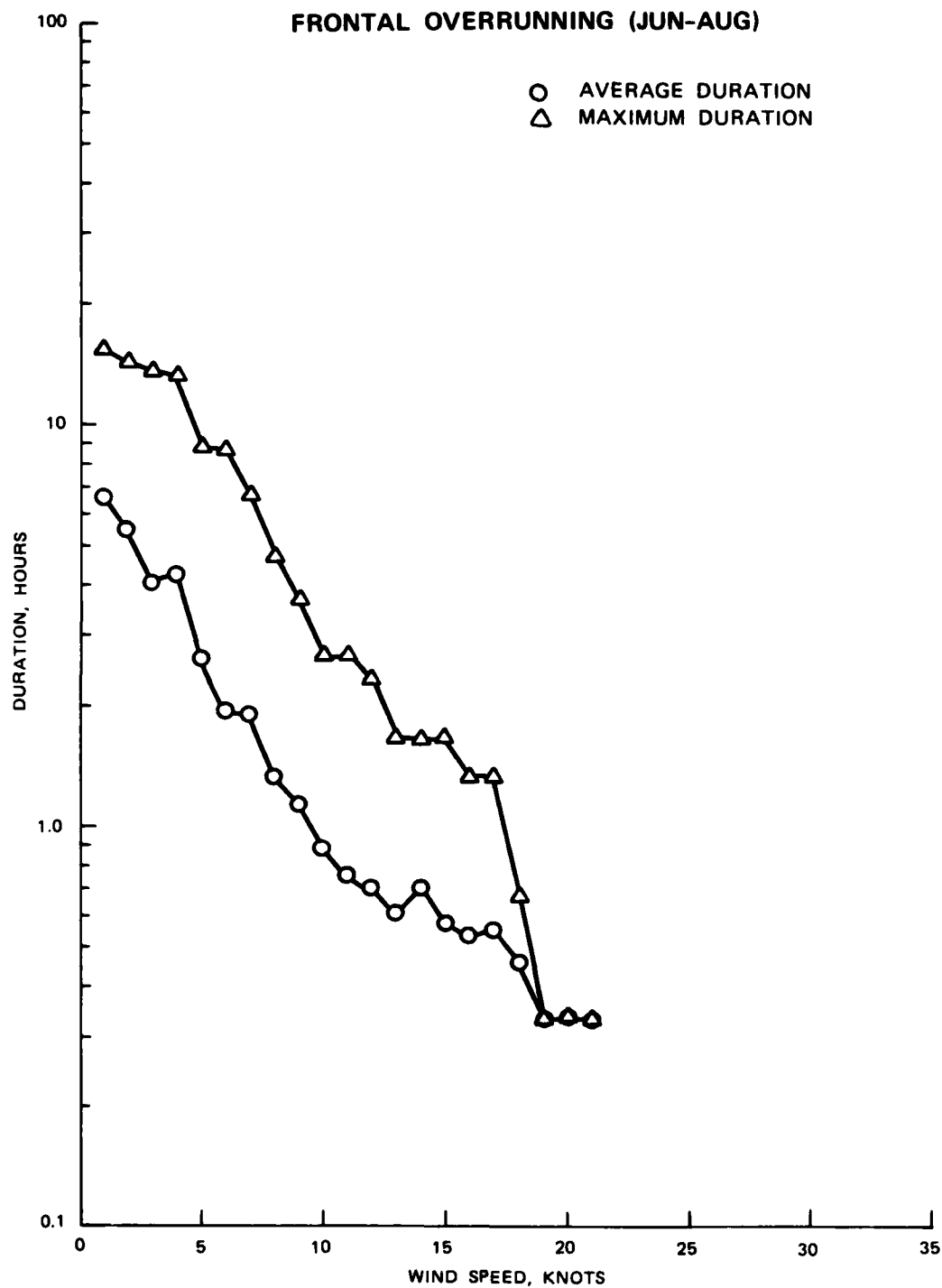


Figure 35. Duration of FOR winds during summer

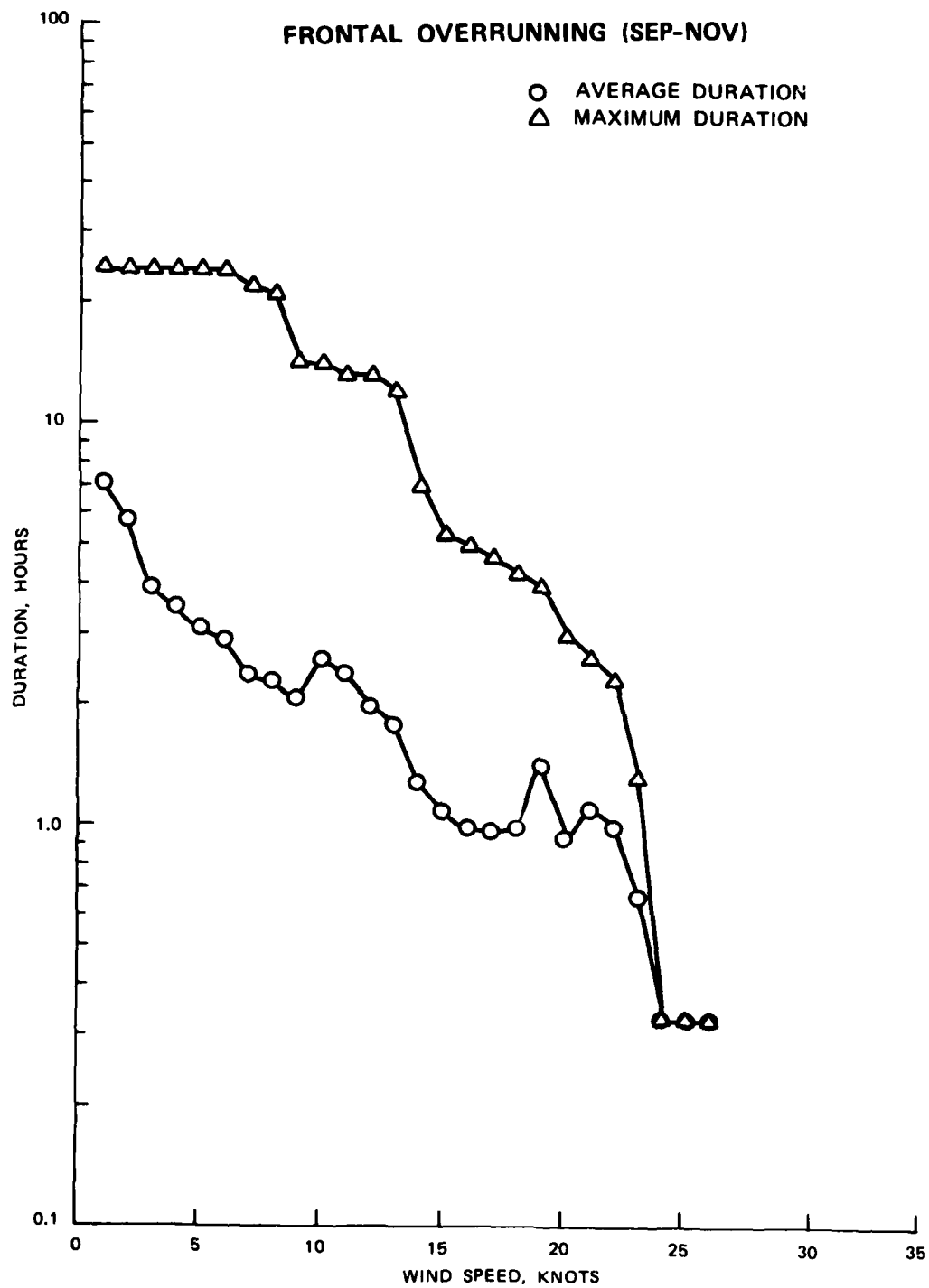


Figure 36. Duration of FOR winds during fall

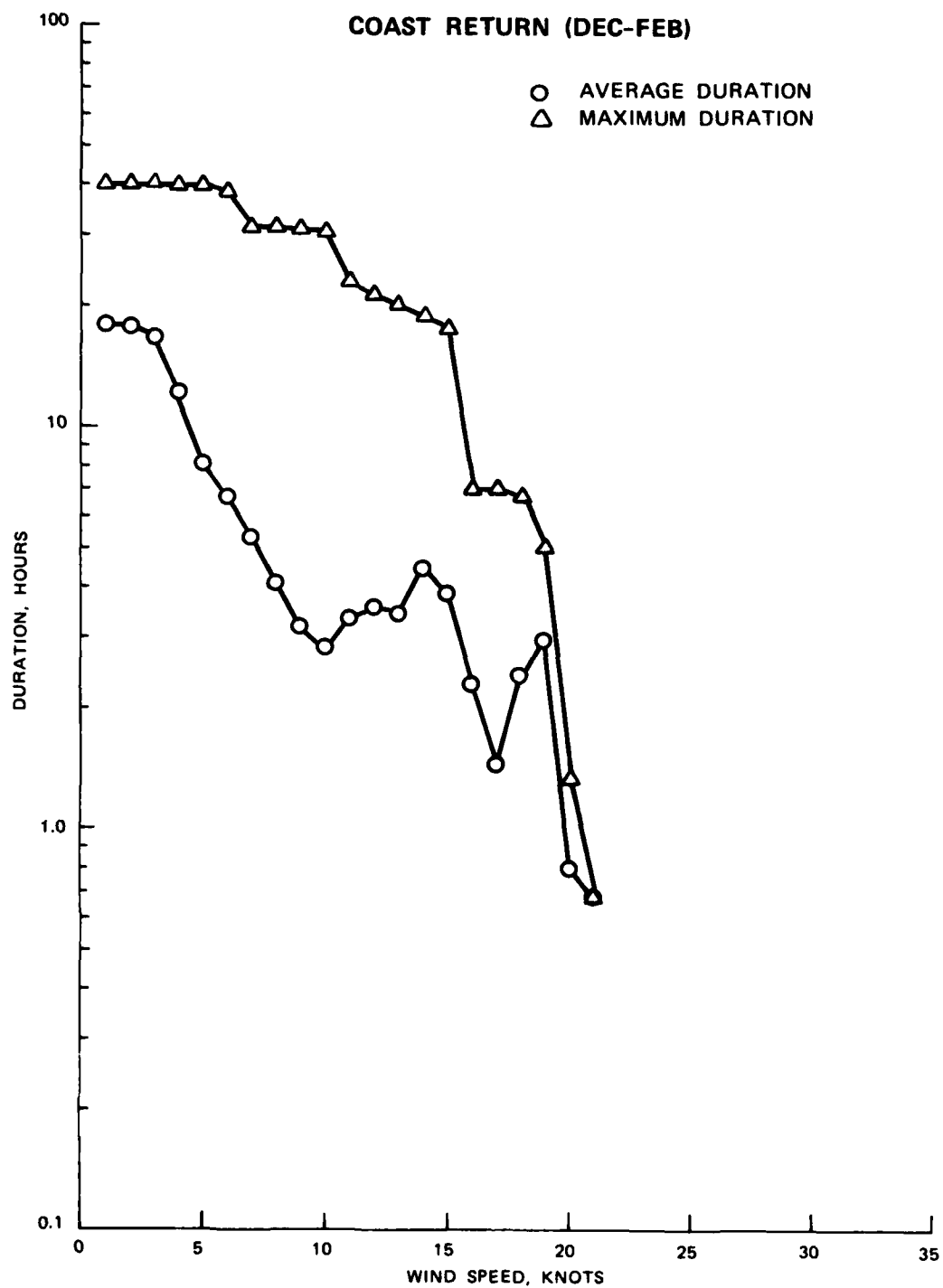


Figure 37. Duration of CR winds during winter

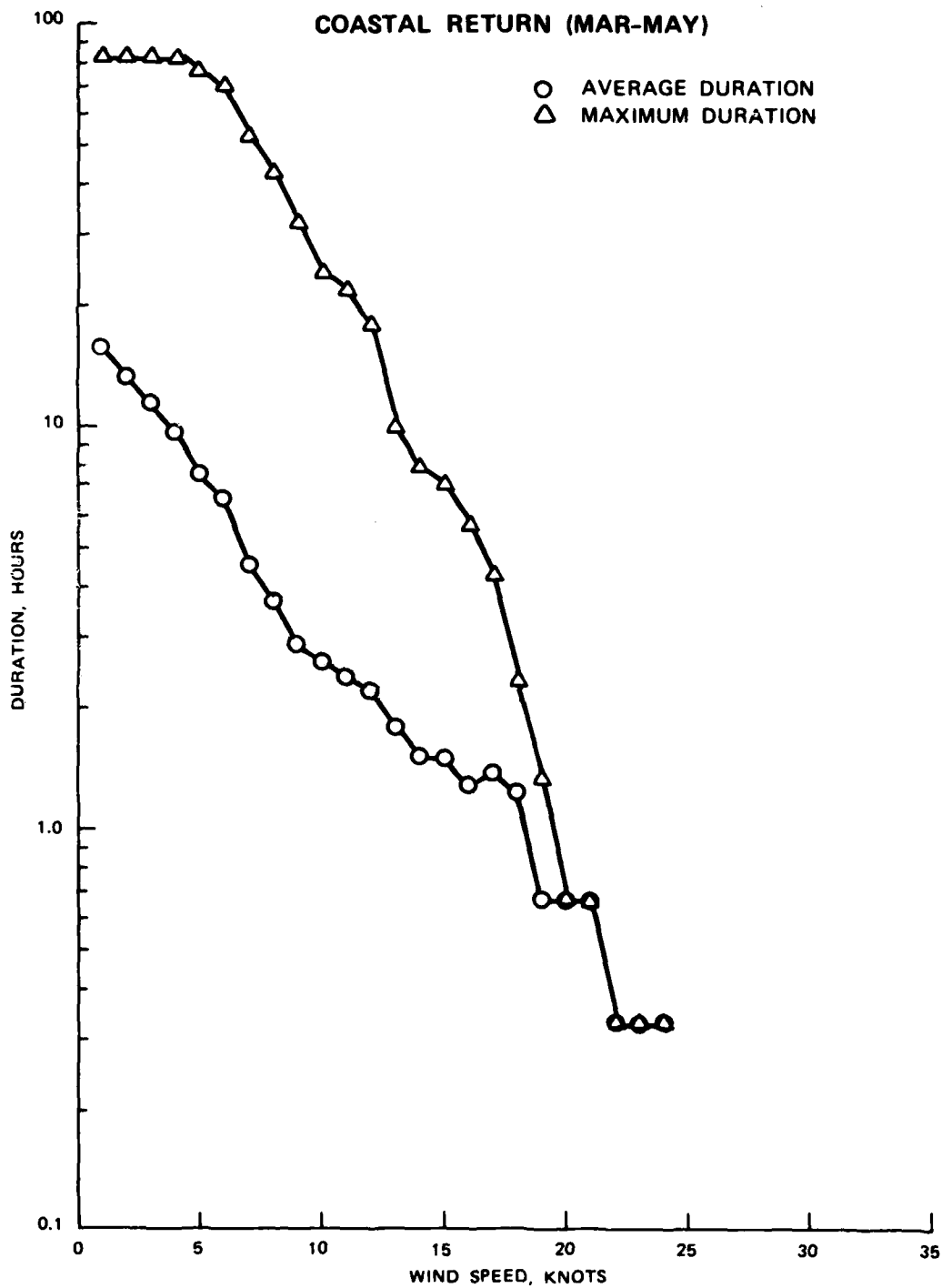


Figure 38. Duration of CR winds during spring

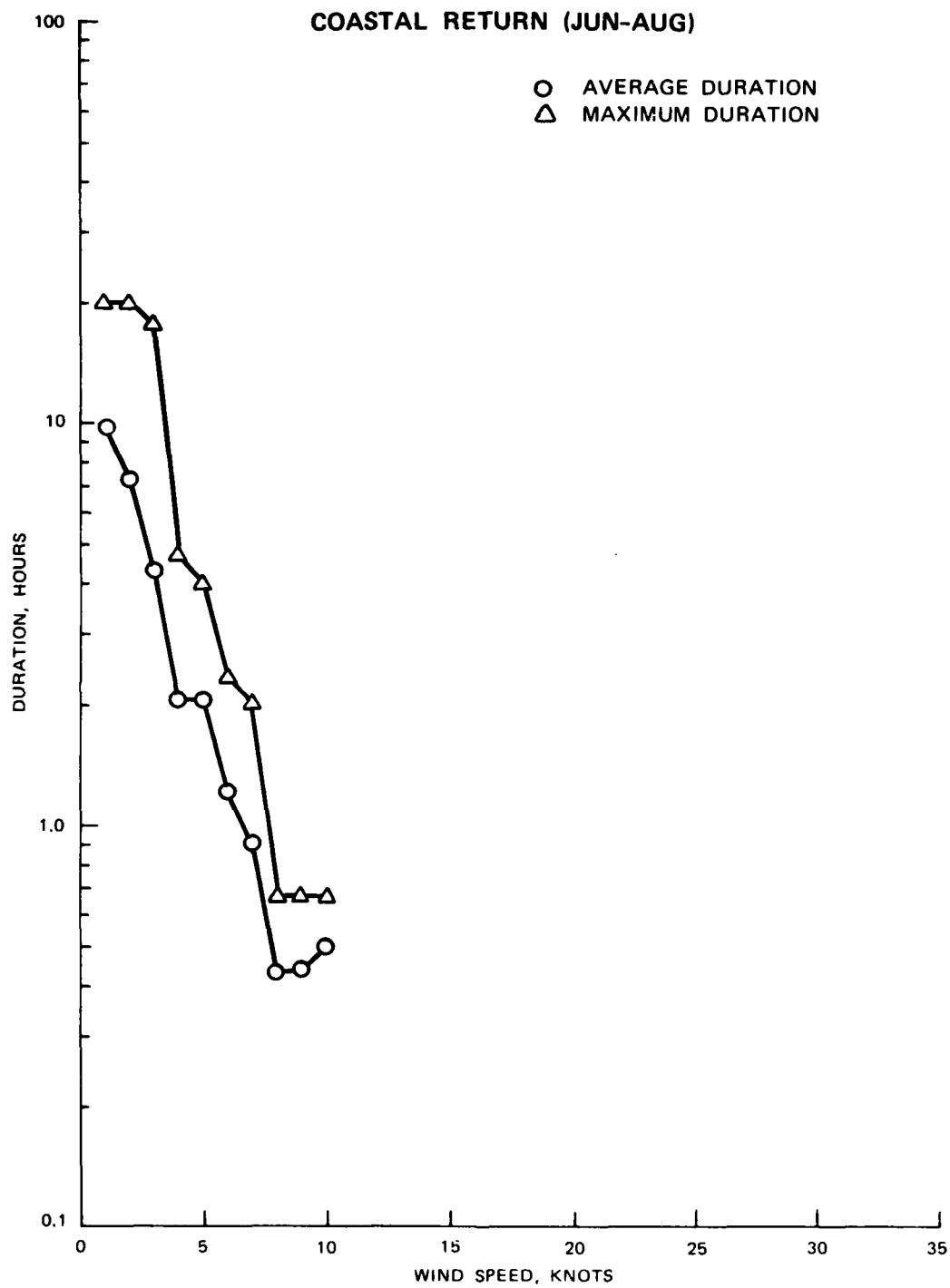


Figure 39. Duration of CR winds during summer

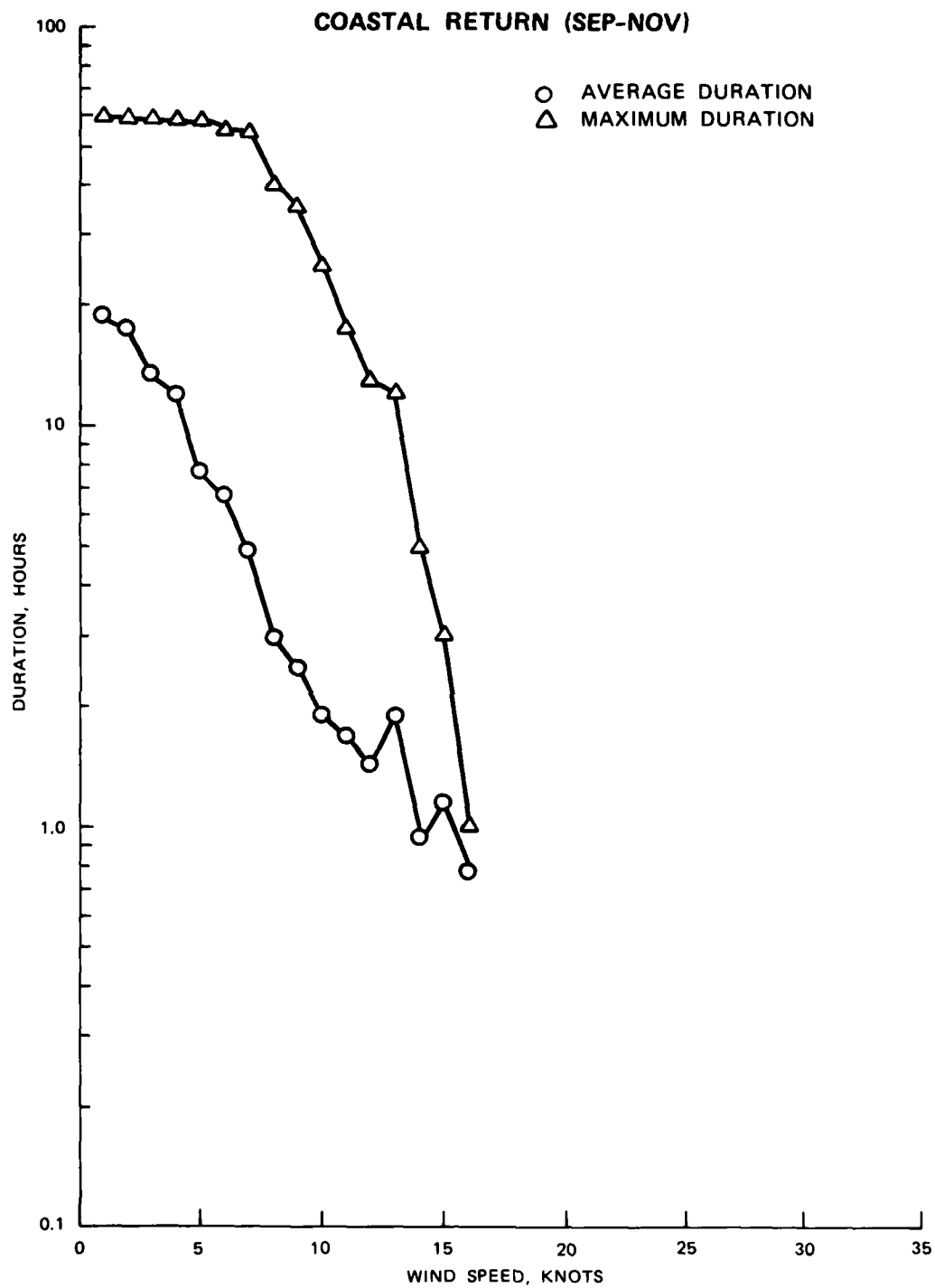


Figure 40. Duration of CR winds during fall

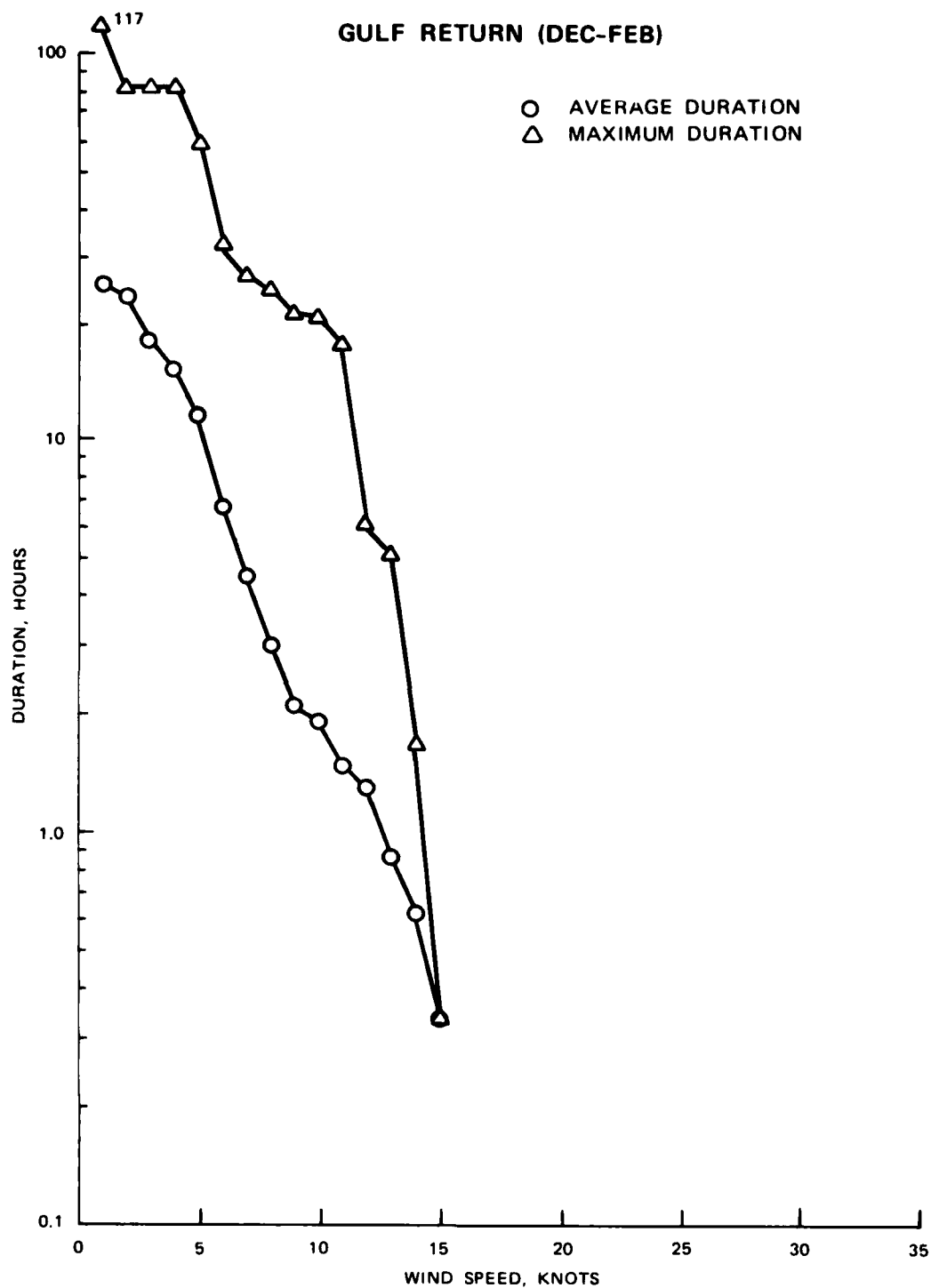


Figure 41. Duration of GR winds during winter

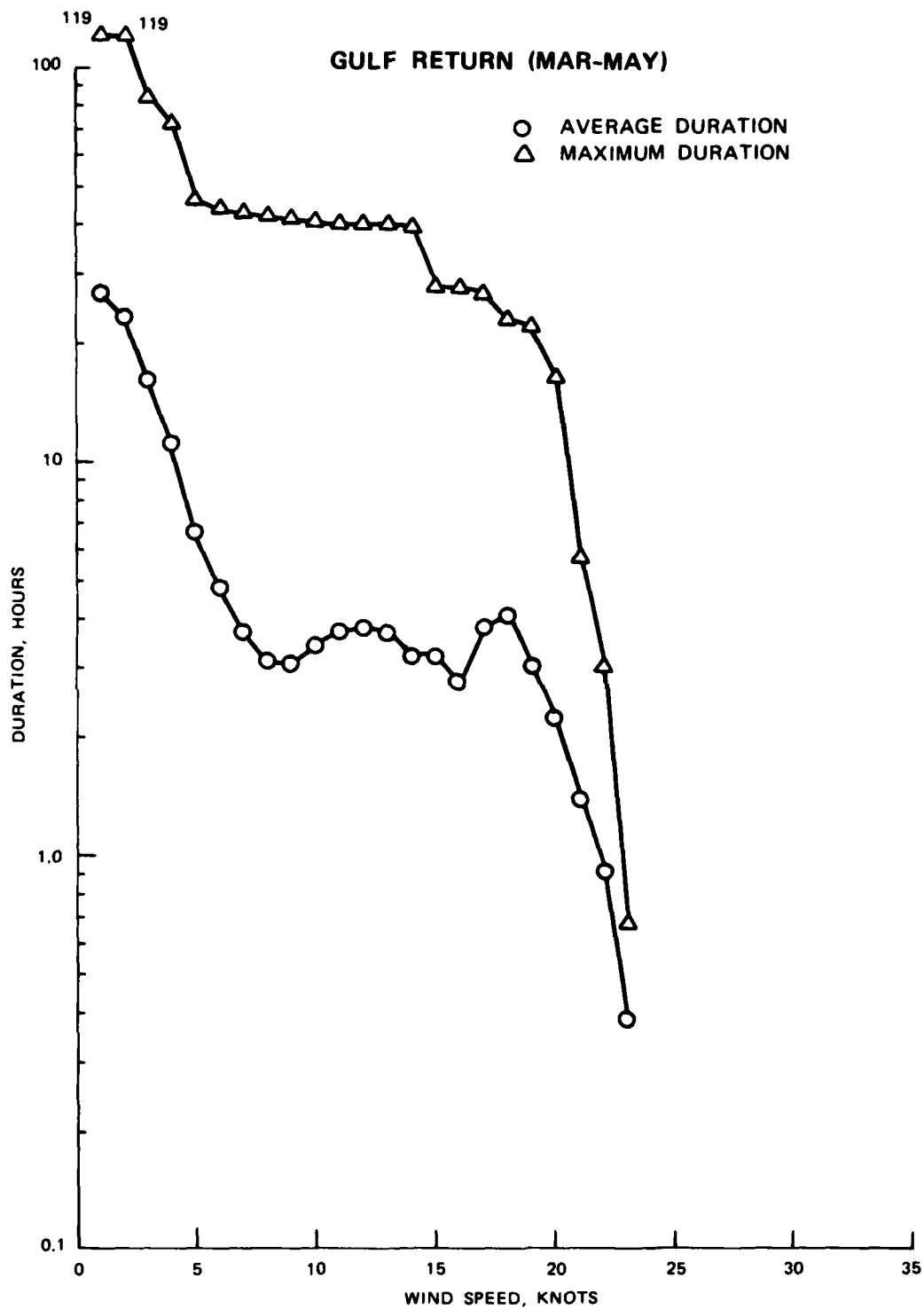


Figure 42. Duration of GR winds during spring

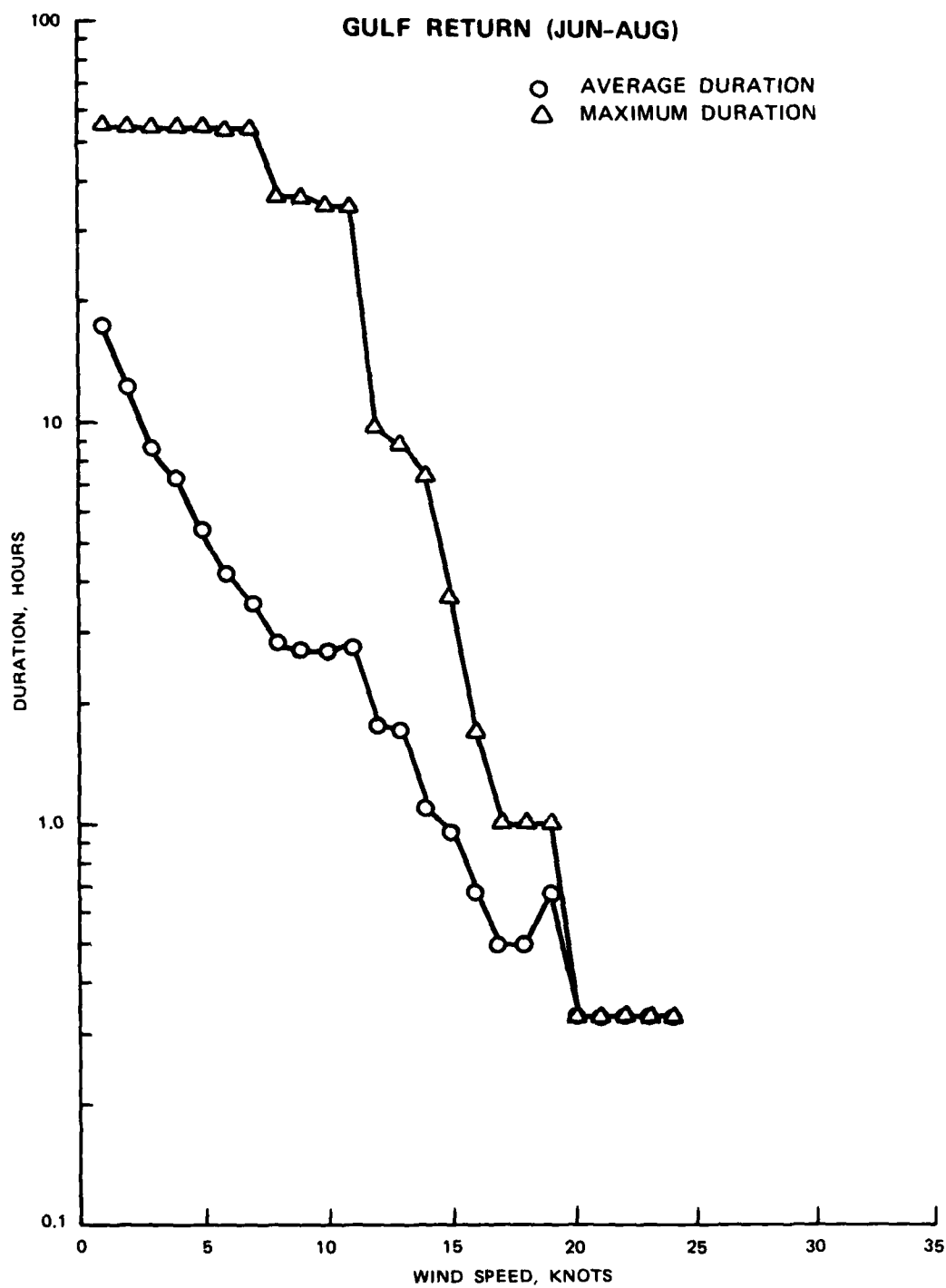


Figure 43. Duration of GR winds during summer

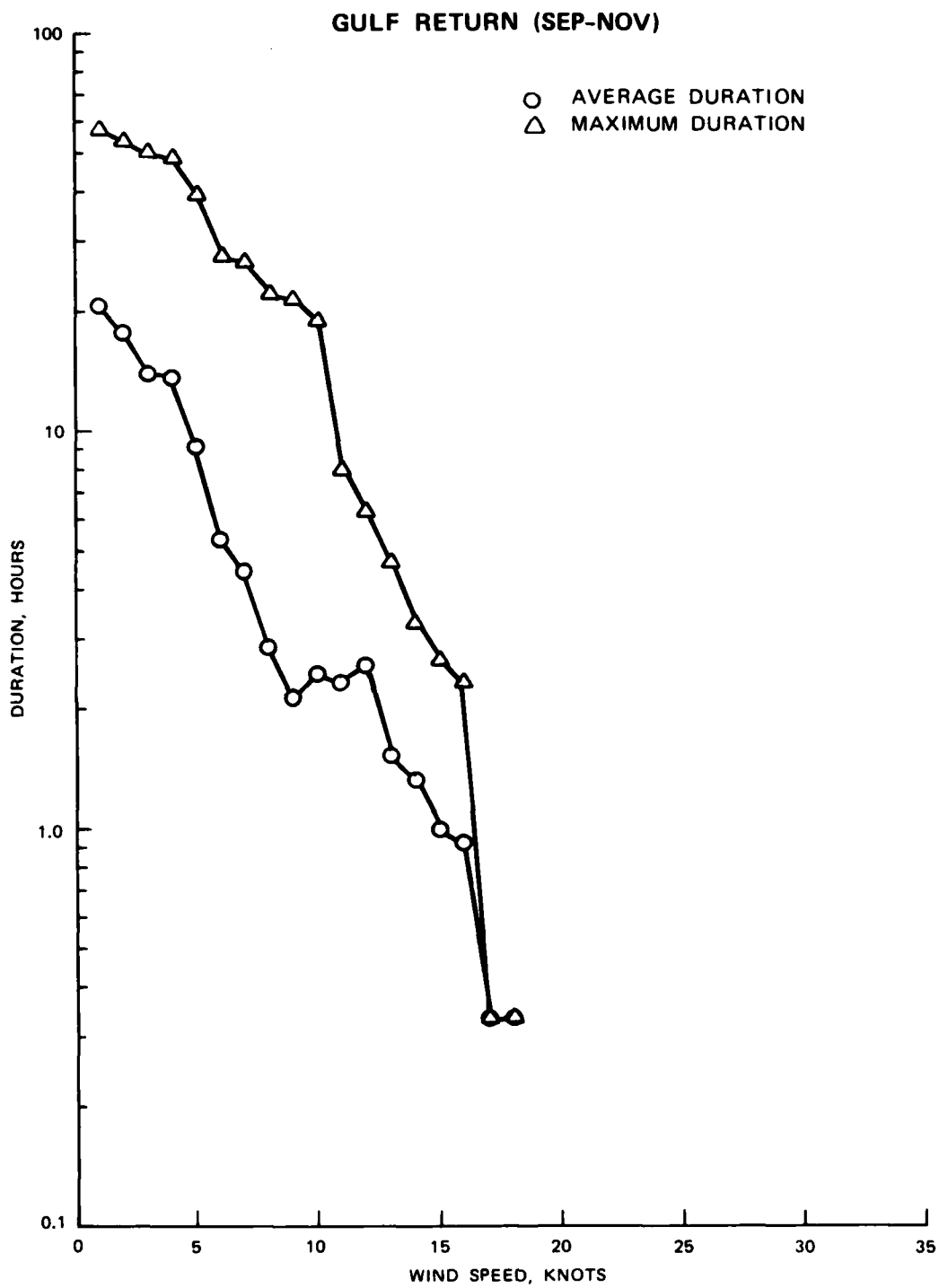


Figure 44. Duration of GR winds during fall

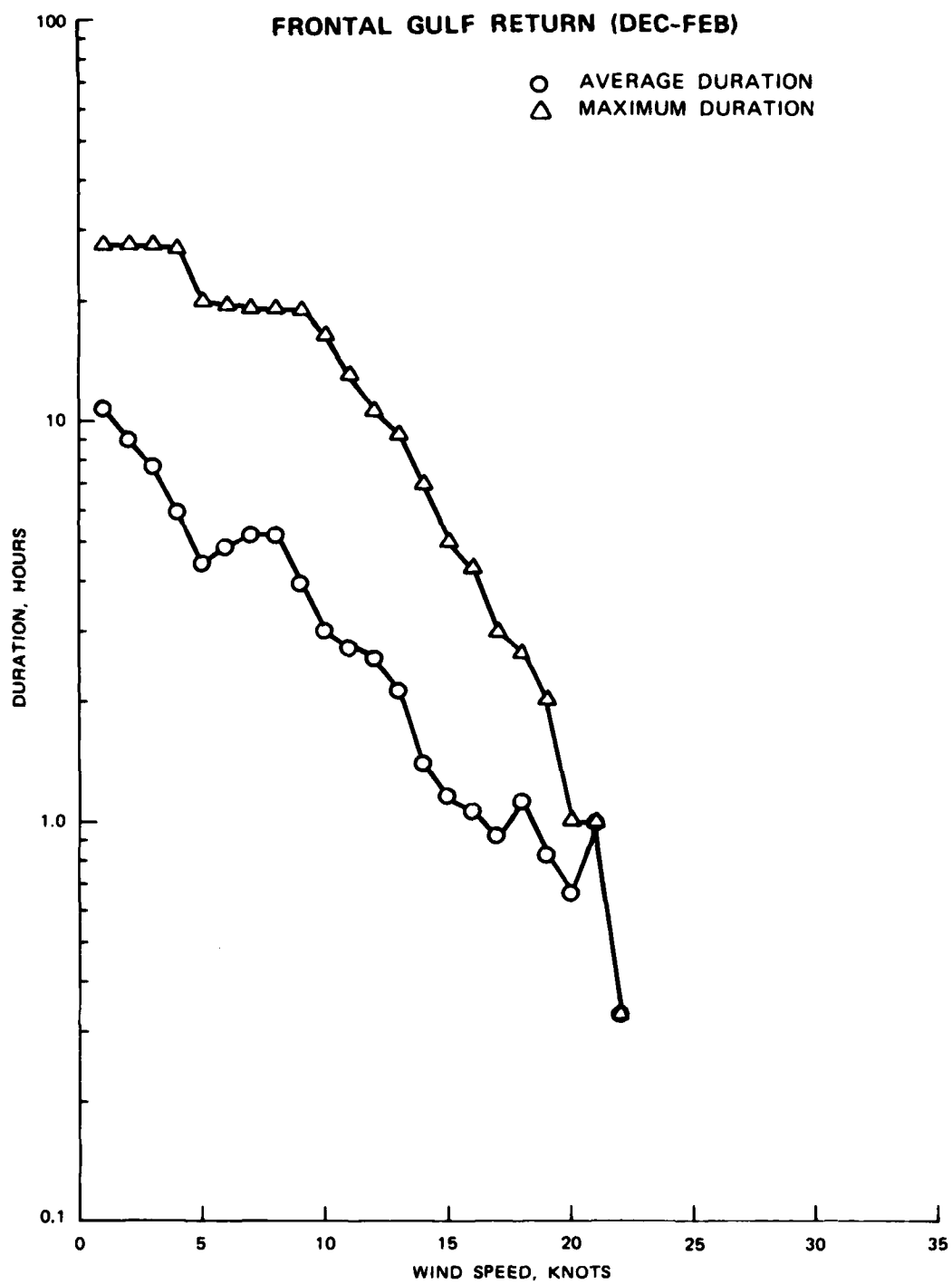


Figure 45. Duration of FGR winds during winter

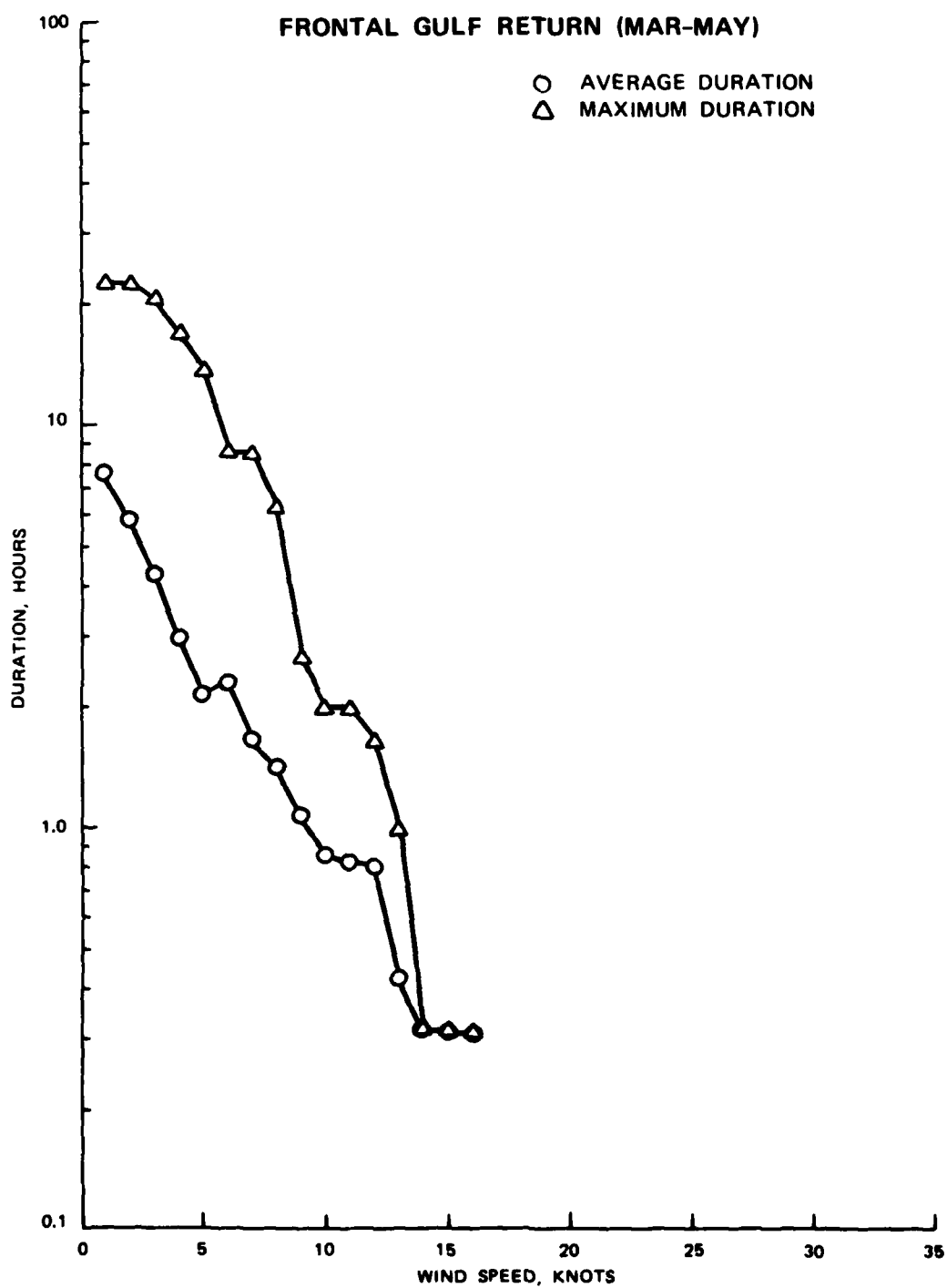


Figure 46. Duration of FGR winds during spring

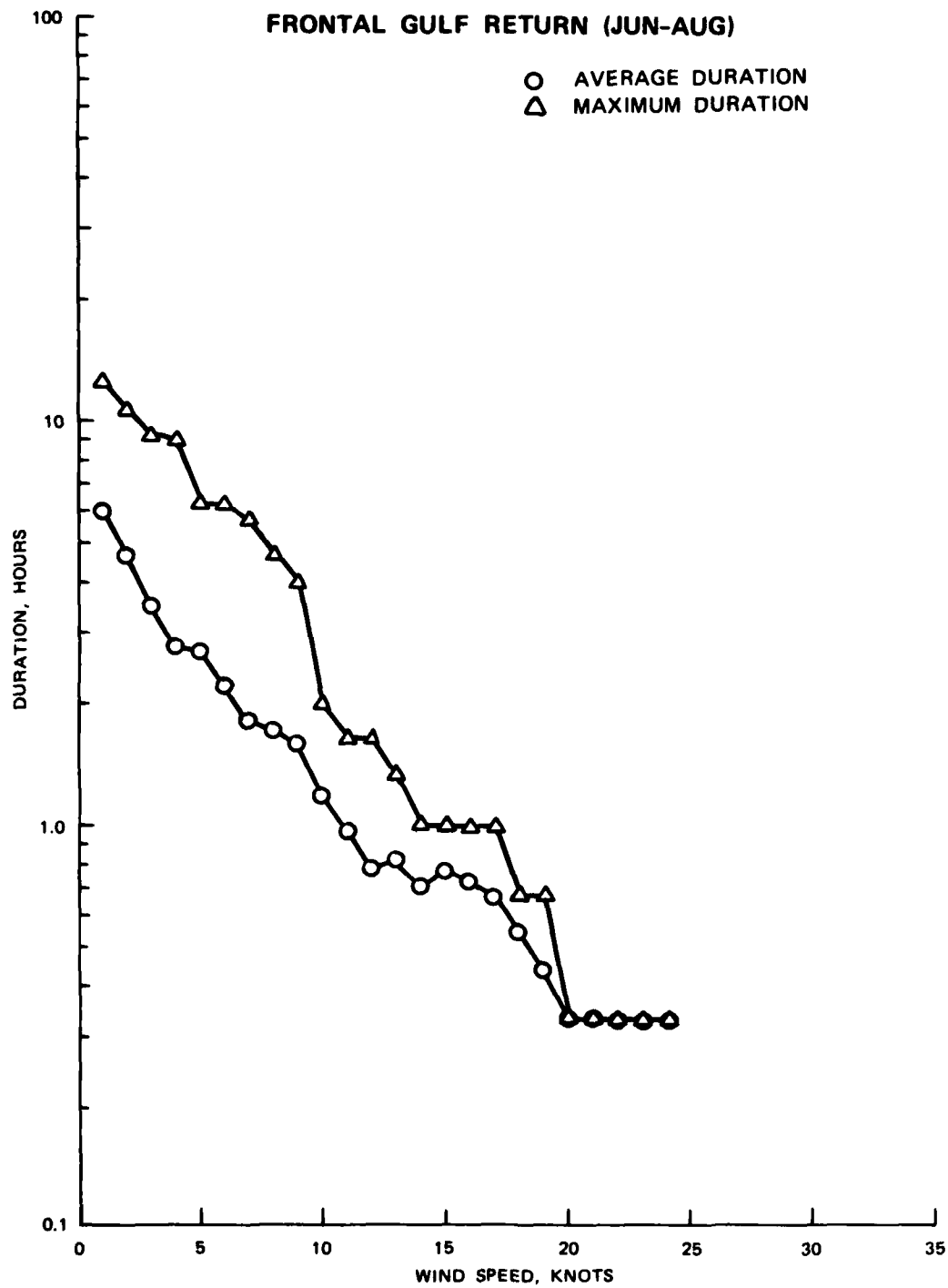


Figure 47. Duration of FGR winds during summer

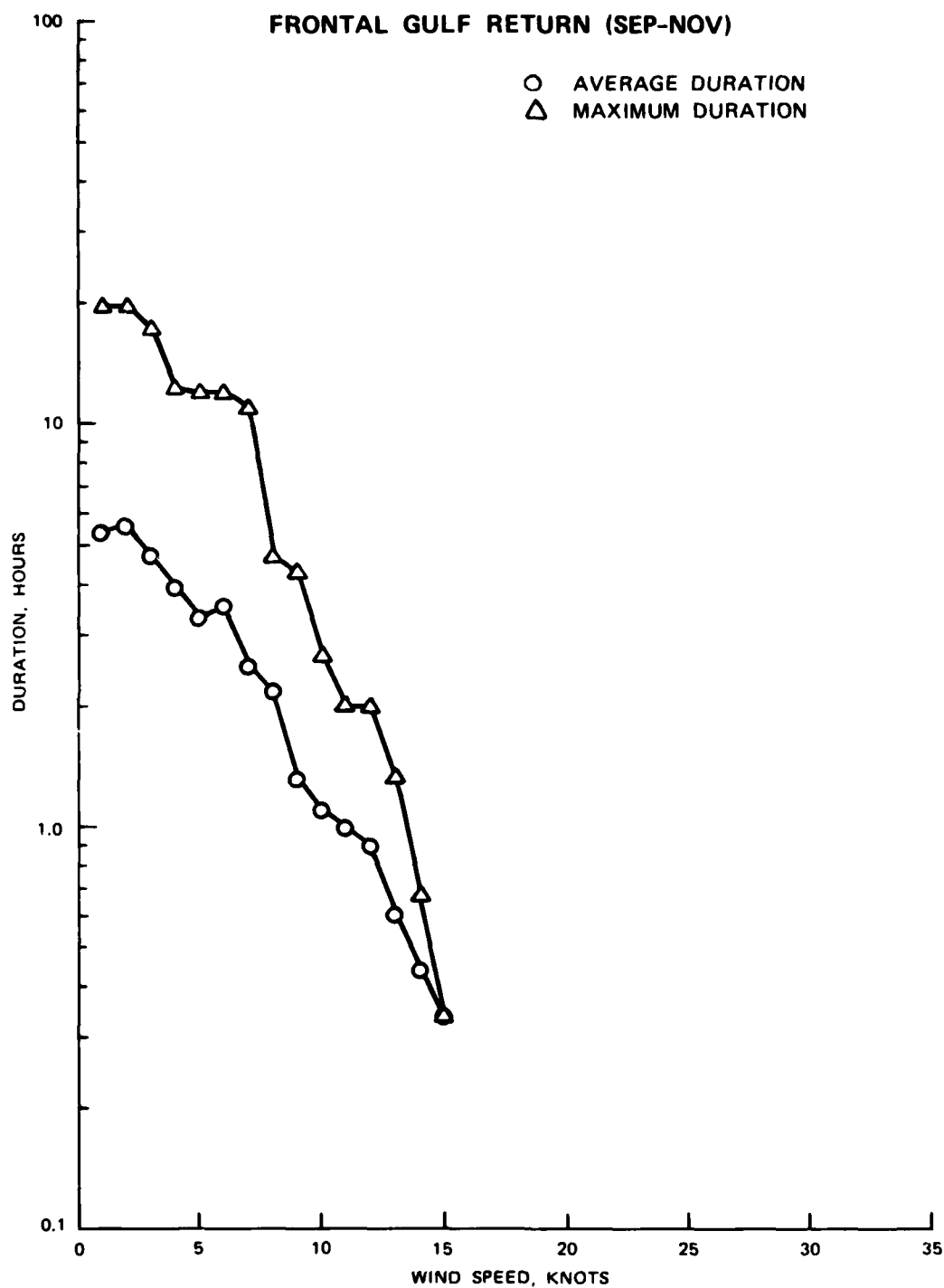


Figure 48. Duration of FGR winds during fall

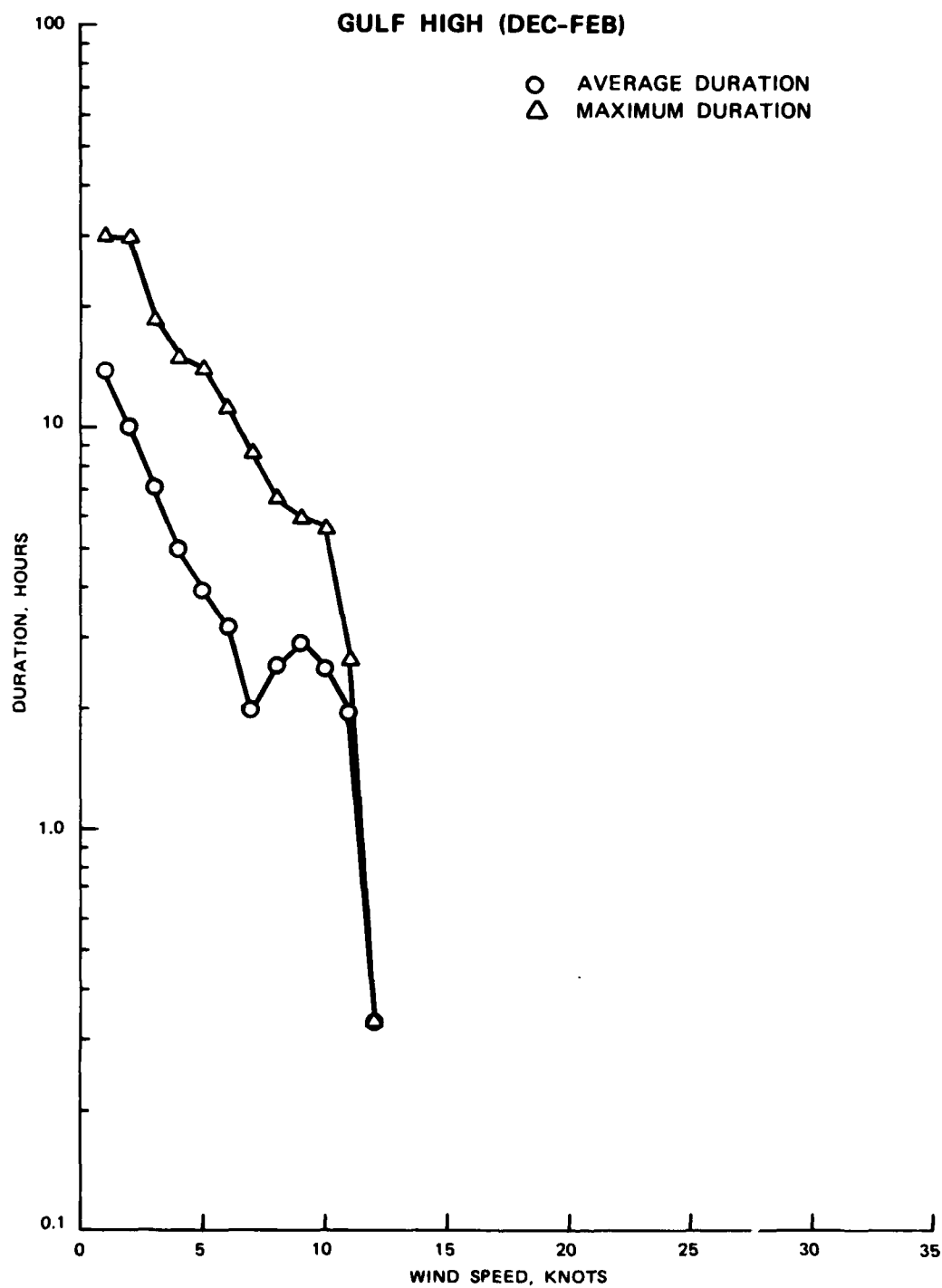


Figure 49. Duration of GH winds during winter

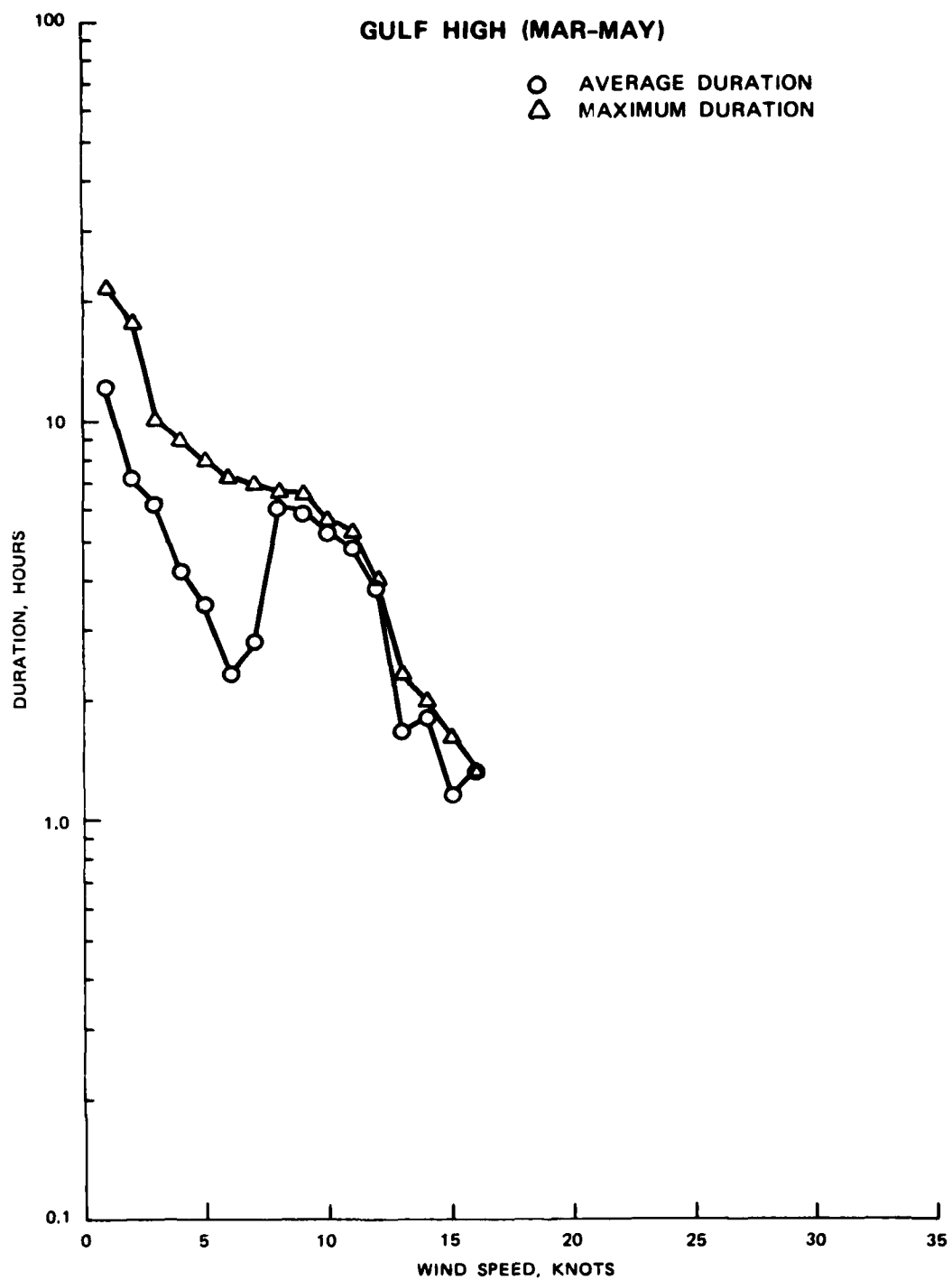


Figure 50. Duration of GH winds during spring

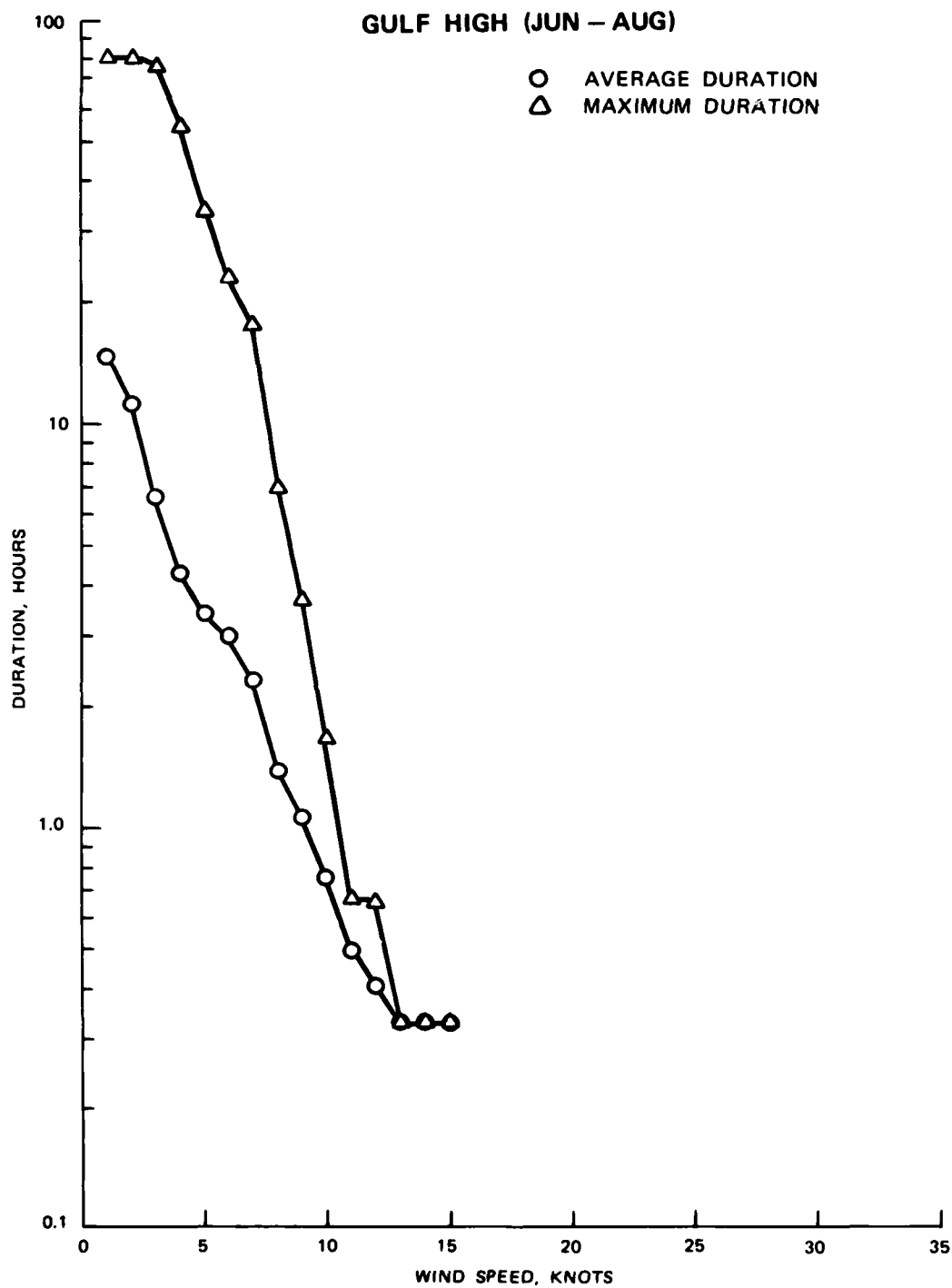


Figure 51. Duration of GH winds during summer

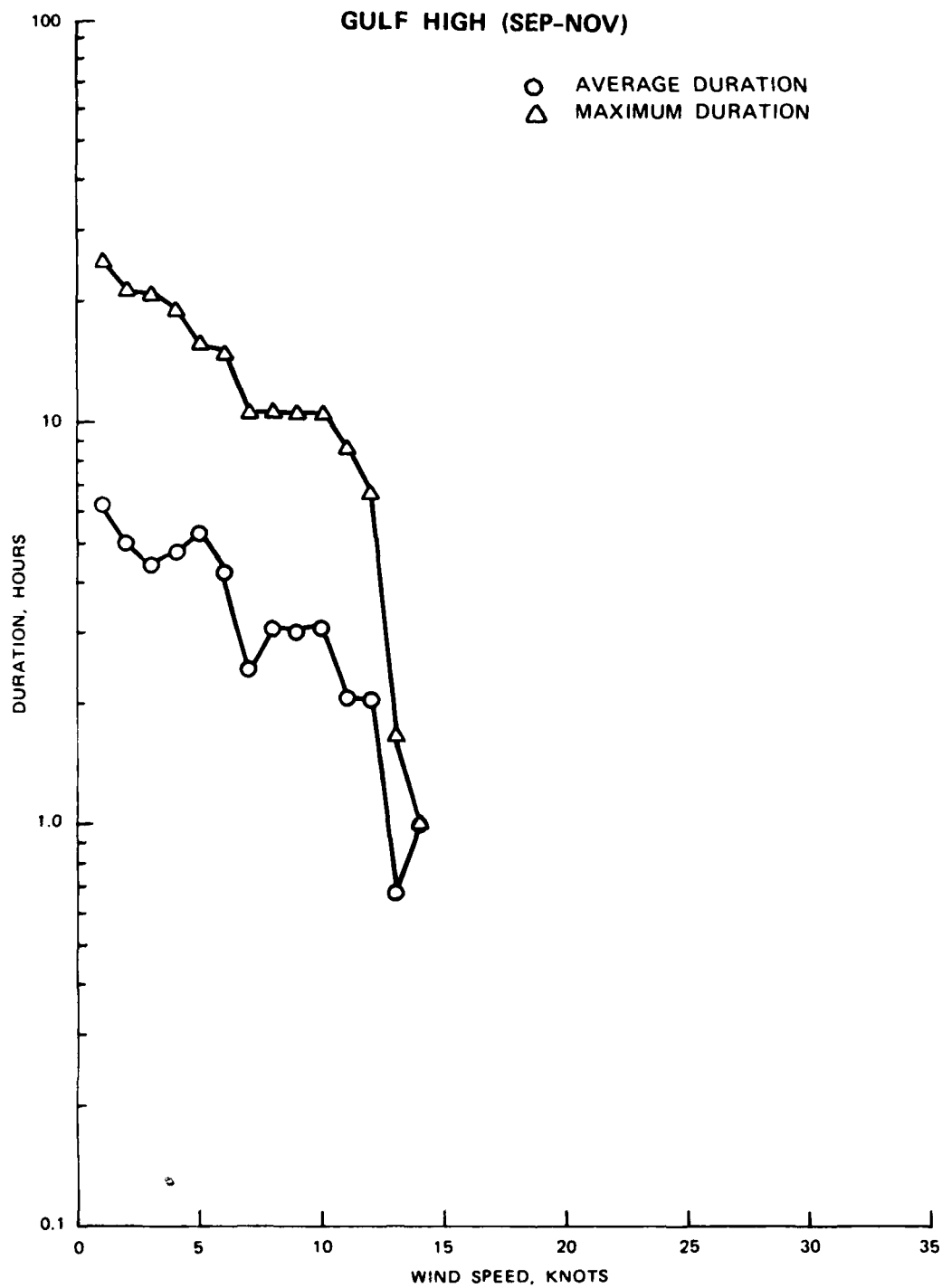


Figure 52. Duration of GH winds during fall

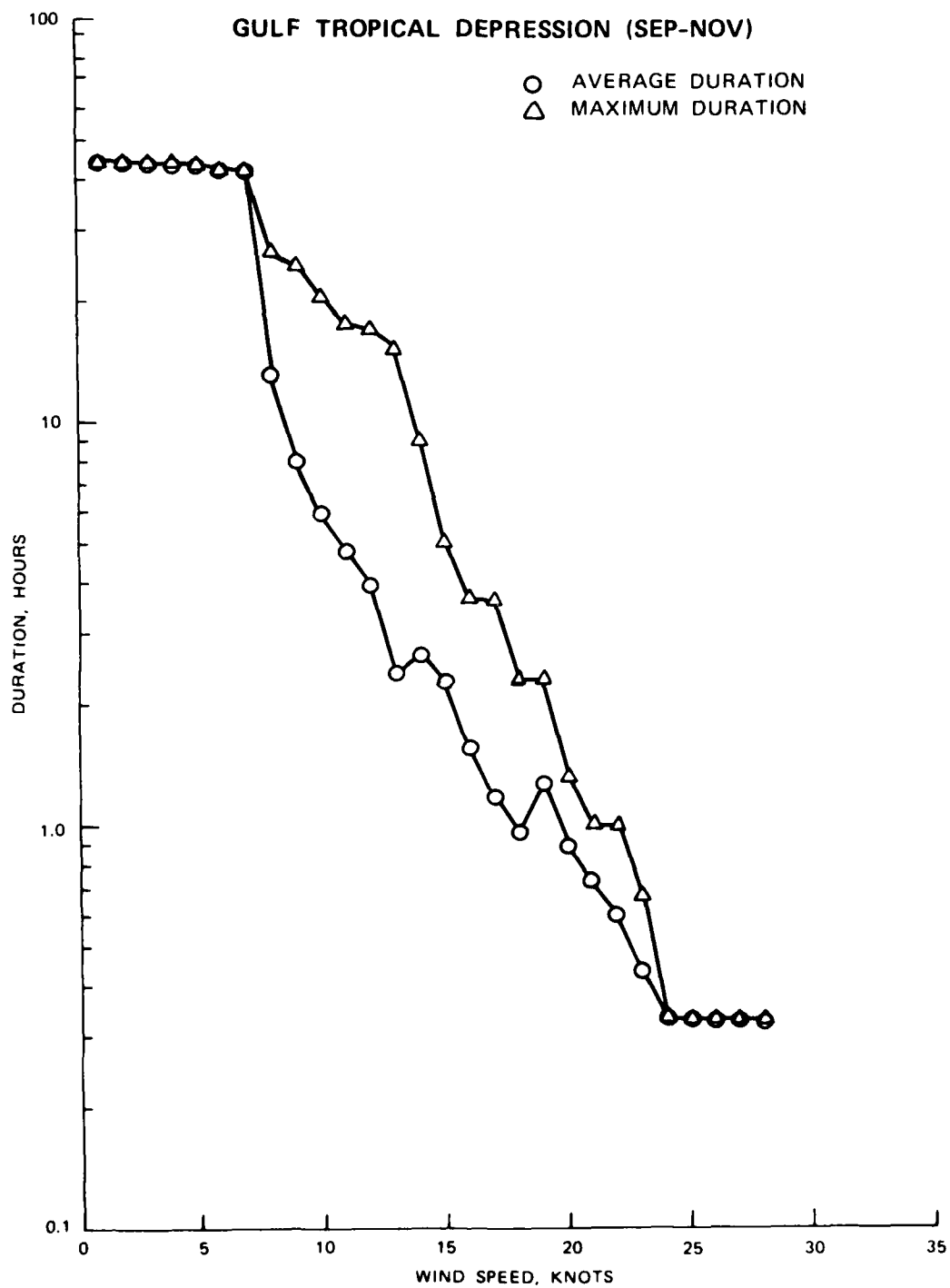


Figure 53. Duration of GTD winds during fall

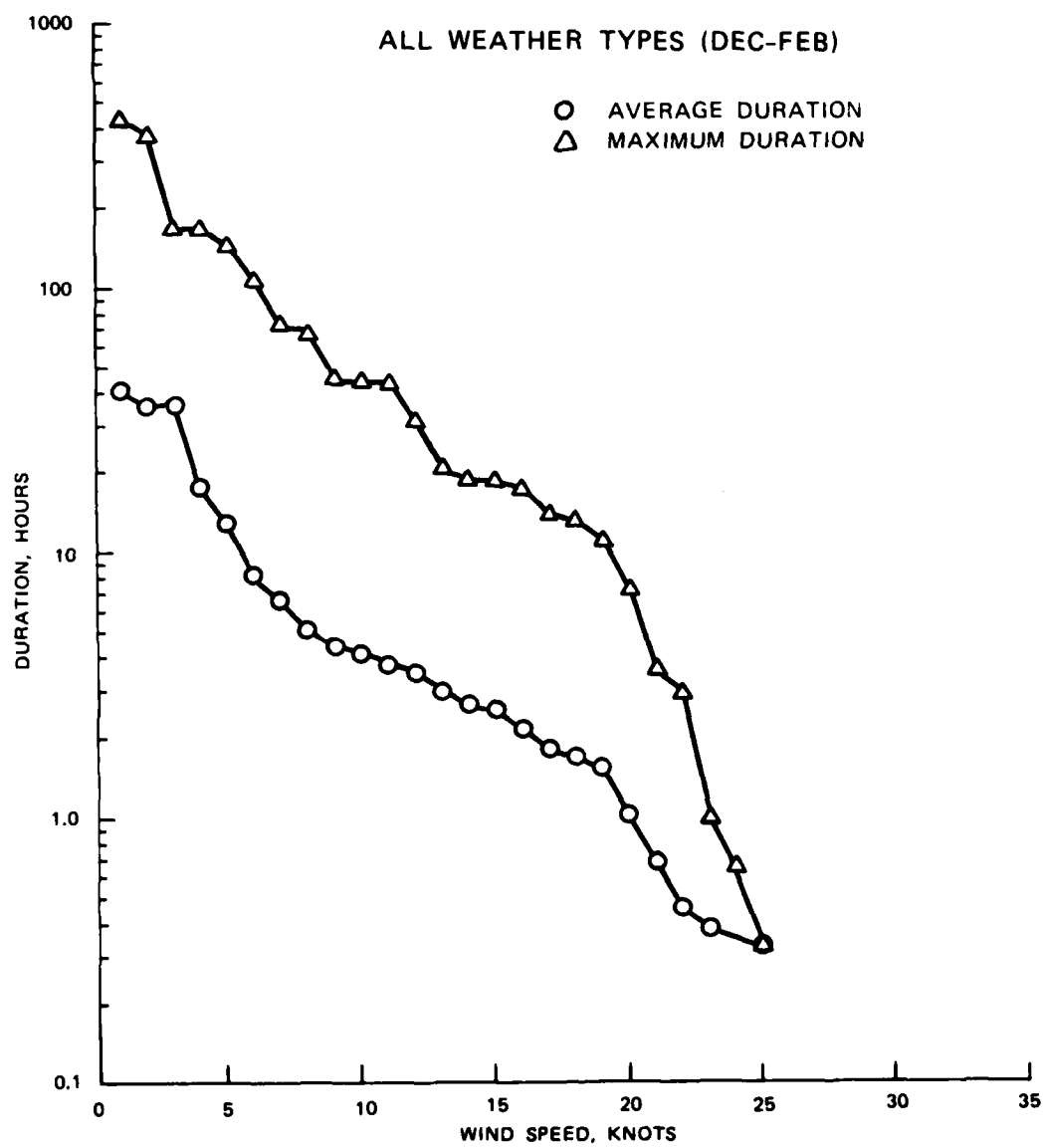


Figure 54. Duration of winds during winter (all weather types)

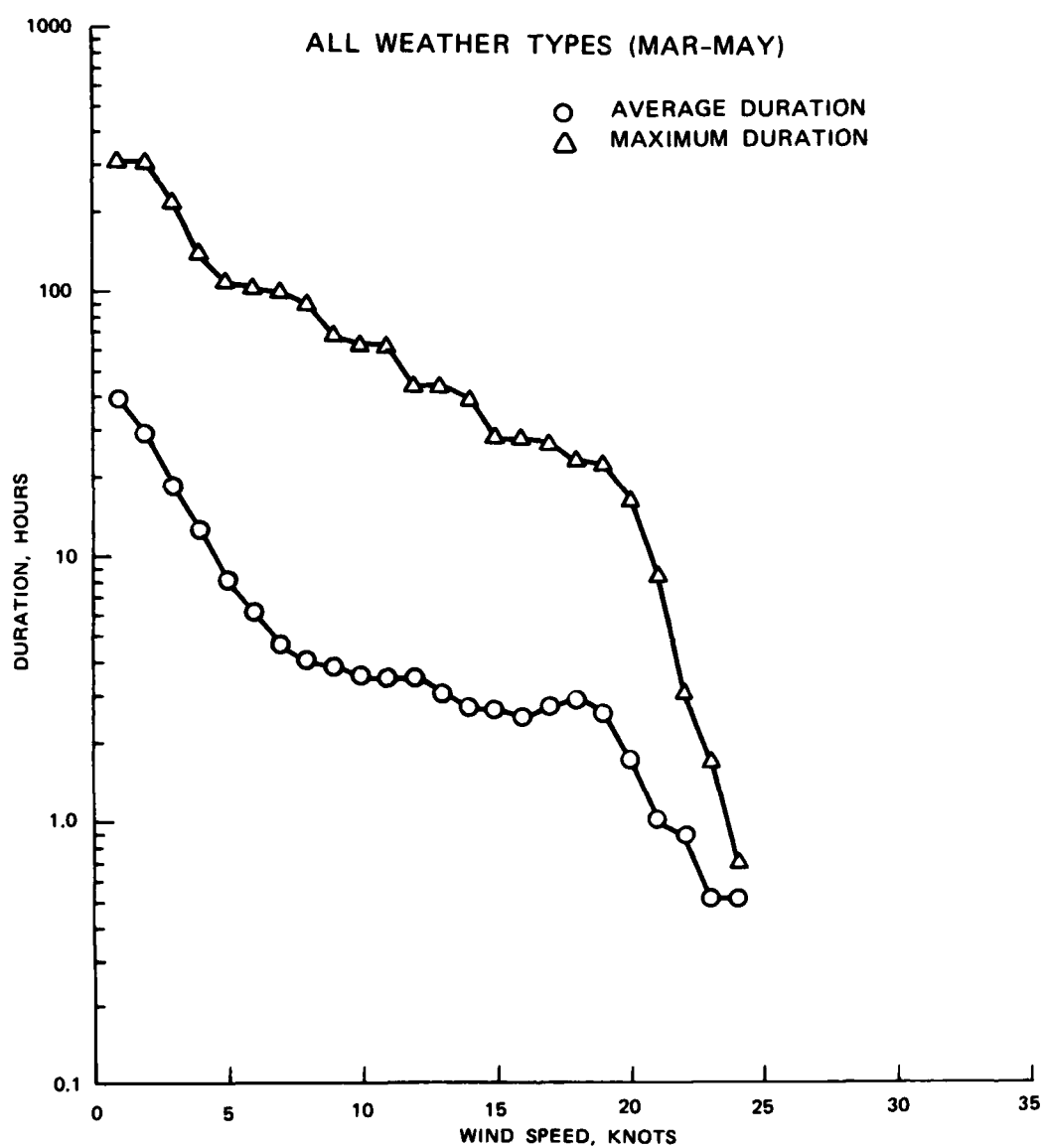


Figure 55. Duration of winds during spring (all weather types)

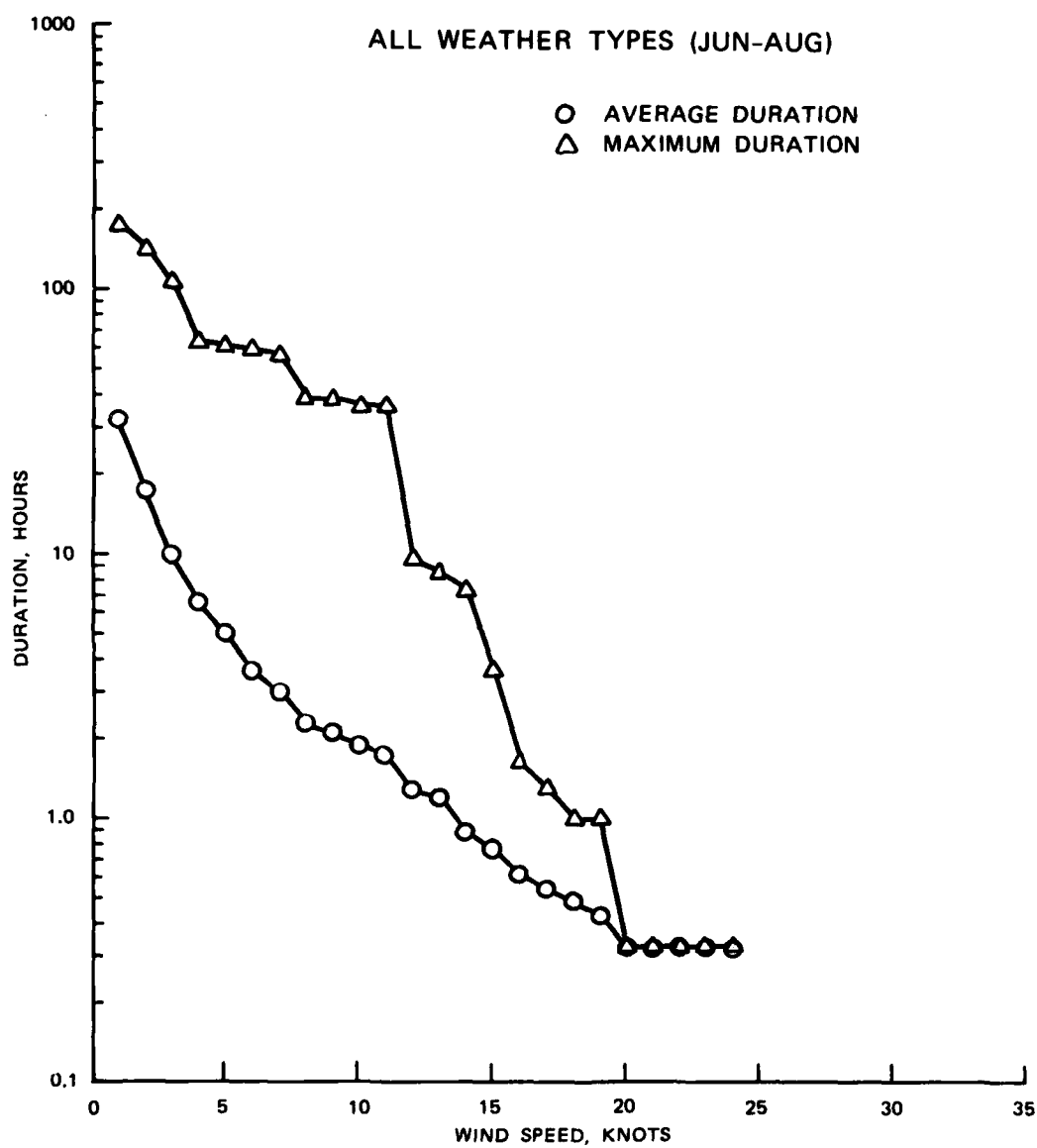


Figure 56. Duration of winds during summer (all weather types)

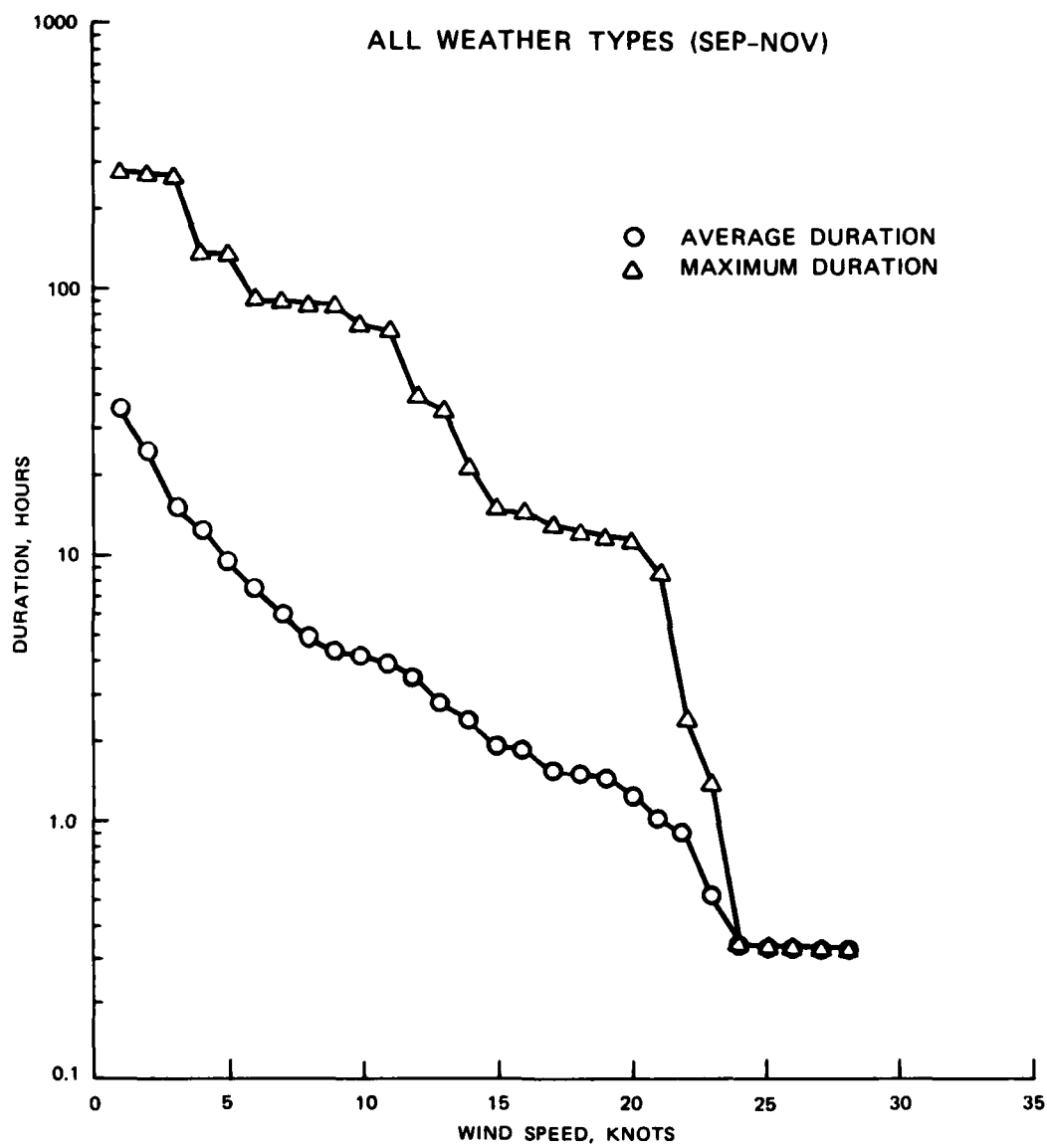


Figure 57. Duration of winds during fall (all weather types)

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